


2019

## The Relationship of English Language Scores on International Students' Academic Success

Rebekah Shbeeb  
*University of Central Florida*

 Part of the [Curriculum and Instruction Commons](#), [Higher Education and Teaching Commons](#), and the [Reading and Language Commons](#)

Find similar works at: <https://stars.library.ucf.edu/etd>

University of Central Florida Libraries <http://library.ucf.edu>

This Doctoral Dissertation (Open Access) is brought to you for free and open access by STARS. It has been accepted for inclusion in Electronic Theses and Dissertations, 2004-2019 by an authorized administrator of STARS. For more information, please contact [STARS@ucf.edu](mailto:STARS@ucf.edu).

---

### STARS Citation

Shbeeb, Rebekah, "The Relationship of English Language Scores on International Students' Academic Success" (2019). *Electronic Theses and Dissertations, 2004-2019*. 6577.  
<https://stars.library.ucf.edu/etd/6577>

THE RELATIONSHIP OF ENGLISH LANGUAGE SCORES ON INTERNATIONAL  
STUDENTS' ACADEMIC SUCCESS

by

REBEKAH A. SHBEEB

B.S. University of North Florida, 2006

M.A. Lancaster University & The Polish Academy of Sciences, 2013

A dissertation submitted in partial fulfillment of the requirements  
for the degree of Doctor of Education  
in the Department of Learning Sciences and Educational Research  
in the College of Community Innovation and Education  
at the University of Central Florida  
Orlando, Florida

Summer Term  
2019

Major Professor: Karen L. Biraimah

© 2019 Rebekah Shbeeb

## **ABSTRACT**

International graduate students at the University of Central Florida (UCF) are not completing graduate programs at the same rate as domestic graduate students. One of the main differences in the admissions process for international graduate students compared to domestic students is the English language test requirement.

The purpose of this study was twofold: to test if the Test of English as a Foreign Language (TOEFL) or the (International English Language Testing System) IELTS scores have any statistically significant linear relationships to international graduate students' academic success as defined by their cumulative grade point average (CGPA). Secondly, this study sought to understand how international graduate students feel about the TOEFL and/or IELTS, and whether or not they feel prepared for study with regards to their English language ability.

Using mixed-methods research, data were retrieved from international graduate students who graduated from UCF during the 2012 – 2016 academic school years. Information from a total of 583 international graduate students was included in the retrieved data collection and data analyses. A survey was also utilized to assess current international graduate students' perceptions of the English language test and requirements. A total of 235 students completed the survey.

The study demonstrated that TOEFL and IELTS scores do not have any statistically significant linear relationship to international graduate students' CGPA. Therefore, results from this research study did not indicate that the English language test scores have an impact on academic success for international graduate students who met the UCF admission requirements. The findings also demonstrate that international graduate students generally

feel the scores are an accurate assessment of their English language abilities. However, many international graduate students expressed a desire for additional English language resources.

The findings are beneficial in able to better understand whether or not English language test scores have any impact on international graduate students' success, and to more accurately comprehend the international graduate students' perspective regarding the language requirement.

To my family.

## **ACKNOWLEDGEMENTS**

This research has been quite a journey, and I was not alone in my quest. I am grateful and thankful to everyone who has helped me throughout this process.

First and foremost, I thank God. For You have blessed me beyond measure. You have held my hand and opened doors. Without You, none of this would have been possible.

Thank you to my husband and best friend, Gideon, for your unwavering belief in me. I am grateful for your countless hours of support, and the sacrifices you made in order to help me achieve this goal - all the while helping to raise our young and amazing family. I am so blessed to be your wife.

I am thankful to my parents, Dr. Edward Addy and Mrs. Eleanor Addy, and sister, Mrs. Rachel Krausmann, for your steadfast love, immense support, and constant encouragement throughout my years of study. To my dad, thank you also for your unfaltering guidance and reassurance when the research seemed insurmountable. Without all of you, this journey would have been much more arduous.

I would also like to express my appreciation to my Chair, Dr. Karen Biraimah for your direction and support throughout this process. Thank you also to my committee members, Dr. Hiyan Bai, Dr. Anna Wolford, and Dr. Rosa Cintron-Delgado your valuable advice and insight throughout this research. I am truly grateful for all of the support.

## TABLE OF CONTENTS

LIST OF FIGURES .....	x
LIST OF TABLES .....	xi
LIST OF ABBREVIATIONS .....	xiii
CHAPTER ONE: INTRODUCTION .....	1
The Rise of International Students .....	1
Background to the Problem .....	3
Who is Affected .....	5
Organizational Context .....	5
Relationship to Other Problems .....	7
Statement of the Problem .....	8
Purpose of Study .....	8
Research Questions .....	9
Significance of the Study .....	9
Definition of Terms .....	12
Scoring of the English Language Tests .....	13
Organization of the Study .....	14
CHAPTER TWO: LITERATURE REVIEW .....	15
Introduction .....	15
International Student Adjustment .....	16
Test of English as a Foreign Language .....	17
International English Language Testing System .....	19
CHAPTER THREE: METHODOLOGY .....	22
Introduction .....	22
Research Questions .....	22
Research Design and Rationale .....	23
Research Setting and Participants .....	23
Data Collection and Instrumentation .....	24
Retrieved Graduate Data .....	25
Survey .....	26
Data Analysis .....	26
Summary .....	28
CHAPTER FOUR: RESEARCH FINDINGS .....	29
Introduction .....	29
Purpose of the Study .....	29
Research Questions .....	29
Data Results .....	30
Description of Participants for Questions One and Two .....	30
Assumption Checks .....	31
Research Question One .....	32
Data Analysis for Research Question One .....	32



Assumption Checks .....	33
Data Analysis Results .....	34
IELTS and CGPA .....	35
Assumption Checks .....	36
Data Analysis Results .....	38
Research Question Two .....	39
Data Analysis for Research Question Two .....	39
TOEFL Scores by College .....	41
College of Arts and Humanities TOEFL Scores and CGPAs.....	41
Assumption Checks .....	42
Data Analysis Results .....	43
College of Business TOEFL Scores and CGPAs .....	44
Assumption Checks .....	45
Data Analysis Results .....	47
College of Education and Human Performance TOEFL Scores and CGPAs .....	48
Assumption Checks .....	49
Data Analysis Results .....	51
College of Engineering and Computer Science TOEFL Scores and CGPAs .....	52
Assumption Checks .....	53
Data Analysis Results .....	55
College of Health and Public Affairs TOEFL Scores and CGPAs .....	56
Assumption Checks .....	57
Data Analysis Results .....	59
College of Optics and Photonics TOEFL Scores and CGPAs.....	61
Assumption Checks .....	61
Data Analysis Results .....	63
College of Medicine TOEFL Scores and CGPAs.....	64
Assumption Checks .....	65
Data Analysis Results .....	67
College of Sciences TOEFL Scores and CGPAs .....	68
Assumption Checks .....	69
Data Analysis Results .....	71
Rosen College of Hospitality Management TOEFL Scores and CGPAs .....	72
Assumption Checks .....	73
Data Analysis Results .....	75
IELTS by College .....	76
College of Engineering and Computer Science IELTS Scores and CGPAs .....	77
Assumption Checks .....	78
Data Analysis Results .....	79
College of Health and Public Affairs IELTS Scores and CGPAs .....	81
Assumption Checks .....	81
Data Analysis Results .....	83
Research Question Three .....	85
Description of Participants for Research Question Three.....	85
Description of Analysis for Research Question Three .....	85
Assumption Checks .....	86
Results .....	87

Survey Results .....	88
Description of Participants who Completed the Survey Questions .....	88
Research Question Four .....	89
Data Analysis for Research Question Four .....	89
Research Question Five .....	92
Data Analysis for Research Question Five .....	92
Summary .....	98
CHAPTER FIVE CONCLUSIONS AND RECOMMENDATIONS .....	99
Introduction .....	99
Findings and Implications .....	100
Discussion of Results and Implications Addressing Question One .....	100
Discussion of Results and Implications Addressing Question Two .....	101
Discussion of Results and Implications Addressing Question Three .....	102
Discussion of Results and Implications Addressing Question Four .....	103
Discussion of Results and Implications Addressing Question Five .....	104
Relevance of the Study .....	105
Limitations of the Study .....	106
Recommendations for Future Research .....	109
Summation .....	110
APPENDIX A: IRB APPROVAL LETTER .....	112
APPENDIX B: SURVEY QUESTIONS .....	114
REFERENCES .....	121

## LIST OF FIGURES

Figure 1 New International Student Enrollment, 2006/07 – 2016/17 .....	2
Figure 2 Graduate Students' Attrition Rates; 2012 - 2016 .....	3
Figure 3: TOEFL Score Chart.....	13
Figure 4: TOEFL and CGPA Condensed Students Scatter Plot .....	33
Figure 5: TOEFL and CGPA Condensed Students Scatter Plot and Linear Regression .....	35
Figure 6: IELTS and CGPA Scatter Plot .....	37
Figure 7: IELTS and CGPA Scatter Plot and Linear Regression .....	39
Figure 8: College of Arts and Humanities TOEFL Scatter Plot .....	42
Figure 9: College of Arts and Humanities TOEFL Scatter Plot and Linear Regression .....	44
Figure 10: College of Business TOEFL Scatter Plot .....	46
Figure 11: College of Business TOEFL Scatter Plot and Linear Regression .....	48
Figure 12: College of Education and Human Performance TOEFL Scatter Plot .....	50
Figure 13: College of Engineering and Computer Science TOEFL Scatter Plot .....	54
Figure 14: College of Engineering and Computer Science TOEFL Scatter Plot and Linear Regression.....	56
Figure 15: College of Health and Public Affairs TOEFL Scatter Plot .....	58
Figure 16: College of Health and Public Affairs TOEFL Scatter Plot and Linear Regression.....	60
Figure 17: College of Optics and Photonics TOEFL Scatter Plot .....	62
Figure 18: College of Optics and Photonics TOEFL Scatter Plot and Linear Regression .....	64
Figure 19: College of Medicine TOEFL Scatter Plot .....	66
Figure 20: College of Medicine TOEFL Scatter Plot and Linear Regression .....	68
Figure 21: College of Sciences TOEFL Scatter Plot .....	70
Figure 22: College of Sciences TOEFL Scatter Plot and Linear Regression .....	72
Figure 23: Rosen College of Hospitality Management TOEFL Scatter Plot.....	74
Figure 24: Rosen College of Hospitality Management TOEFL Scatter Plot and Linear Regression.....	76
Figure 25: College of Engineering and Computer Science IELTS Scatter Plot .....	78
Figure 26: College of Engineering and Computer Science IELTS Scatter Plot and Linear Regression.....	80
Figure 27: College of Health and Public Affairs IELTS Scatter Plot.....	82
Figure 28: College of Health and Public Affairs IELTS Scatter Plot and Linear Regression.....	84
Figure 29: Students Adequately Prepared for Study.....	90
Figure 30: Students Adequately Prepared for Living in the United States.....	91
Figure 31: Test an Accurate Assessment .....	92
Figure 32: TOEFL Requirement High Enough .....	93
Figure 33: IELTS Requirement High Enough .....	94
Figure 34: English Score Requirement too High.....	95

## LIST OF TABLES

Table 1: Research Questions, Data Collection, and Data Analysis .....	27
Table 2: Descriptive Statistics of TOEFL Scores and CGPAs .....	32
Table 3: TOEFL Scores and CGPAs Regression Statistics .....	34
Table 4: TOEFL Scores and CGPAs ANOVA.....	34
Table 5: TOEFL Scores and CGPAs Confidence Level.....	34
Table 6: Descriptive Statistics of IELTS Scores and CGPAs.....	36
Table 7: IELTS Scores and CGPA Regression Statistics .....	38
Table 8: IELTS Scores and CGPA ANOVA .....	38
Table 9: IELTS Scores and CGPA Confidence Level.....	38
Table 10: College English Language Test Sample .....	40
Table 11: Descriptive Statistics of TOEFL Scores and CGPAs for the College of Arts and Humanities.....	41
Table 12: TOEFL Scores and CGPA College of Arts and Humanities Regression Statistics.....	43
Table 13: TOEFL Scores and CGPA of College of Arts and Humanities ANOVA .....	43
Table 14: TOEFL Scores and CGPA of College of Arts and Humanities Confidence Level .....	43
Table 15: Descriptive Statistics of TOEFL Scores and CGPAs for the College of Business .....	45
Table 16: TOEFL Scores and CGPA College of Business Regression Statistics.....	47
Table 17: TOEFL Scores and CGPA of College of Business ANOVA .....	47
Table 18: TOEFL Scores and CGPA of College of Business Confidence Level.....	47
Table 19: Descriptive Statistics of TOEFL Scores and CGPAs for the College of Education and Human Performance .....	49
Table 20: TOEFL Scores and CGPA College of Education and Human Performance Regression Statistics .....	51
Table 21: TOEFL Scores and CGPA of College of Education and Human Performance ANOVA.....	51
Table 22: TOEFL Scores and CGPA of College of Education and Human Performance Confidence Level .....	51
Table 23: College of Education and Human Performance TOEFL Scatter Plot and Linear Regression .....	52
Table 24: Descriptive Statistics of TOEFL Scores and CGPAs for the College of Engineering and Computer Science .....	53
Table 25: TOEFL Scores and CGPA College of Engineering and Computer Science Regression Statistics .....	55
Table 26: TOEFL Scores and CGPA of College of Engineering and Computer Science ANOVA.....	55
Table 27: TOEFL Scores and CGPA of College of Engineering and Computer Science Confidence Level .....	55
Table 28: Descriptive Statistics of TOEFL Scores and CGPAs for the College of Health and Public Affairs .....	57
Table 29: TOEFL Scores and CGPA College of Health and Public Affairs Regression Statistics.....	59
Table 30: TOEFL Scores and CGPA of Health and Public Affairs ANOVA .....	59
Table 31: TOEFL Scores and CGPA of College of Health and Public Affairs Confidence Level.....	59

Table 32: Descriptive Statistics of TOEFL Scores and CGPAs for the College of Optics and Photonics .....	61
Table 33: TOEFL Scores and CGPA College Optics and Photonics Regression Statistics ....	63
Table 34: TOEFL Scores and CGPA of Optics and Photonics ANOVA .....	63
Table 35: TOEFL Scores and CGPA of College of Optics and Photonics Confidence Level	63
Table 36: Descriptive Statistics of TOEFL Scores and CGPAs for the College of Medicine.	65
Table 37: TOEFL Scores and CGPA College of Medicine .....	67
Table 38: TOEFL Scores and CGPA of College of Medicine ANOVA .....	67
Table 39: TOEFL Scores and CGPA of College of Medicine Confidence Level .....	67
Table 40: Descriptive Statistics of TOEFL Scores and CGPAs for the College of Sciences..	69
Table 41: TOEFL Scores and CGPA College Sciences Regression Statistics .....	71
Table 42: TOEFL Scores and CGPA of College of Sciences ANOVA .....	71
Table 43: TOEFL Scores and CGPA of College of Sciences Confidence Level .....	71
Table 44: Descriptive Statistics of TOEFL Scores and CGPAs for the Rosen College of Hospitality Management .....	73
Table 45: TOEFL Scores and CGPA Rosen College of Hospitality Management Regression Statistics.....	75
Table 46: TOEFL Scores and CGPA of Rosen College of Hospitality Management ANOVA .....	75
Table 47: TOEFL Scores and CGPA of Rosen College of Hospitality Management Confidence Level .....	75
Table 48: Descriptive Statistics of IELTS Scores and CGPAs for the College of Engineering and Computer Science .....	77
Table 49: IELTS Scores and College of Engineering and Computer Science Regression Statistics.....	79
Table 50: IELTS Scores and CGPA of College of Engineering and Computer Science ANOVA.....	79
Table 51: IELTS Scores and CGPA of College of Engineering and Computer Science Confidence Level .....	79
Table 52: Descriptive Statistics of IELTS Scores and CGPAs for the College of Health and Public Affairs .....	81
Table 53: IELTS Scores and College of Health and Public Affairs Regression Statistics .....	83
Table 54: IELTS Scores and CGPA of College of Health and Public Affairs ANOVA .....	83
Table 55: IELTS Scores and CGPA of College of Health and Public Affairs Confidence Level.....	83
Table 56: English Waivers and CGPA .....	86
Table 57: English Language Score Waivers CGPA verses Non-waived CGPA Independent Samples Test.....	87
Table 58: Survey Results .....	88
Table 59: Survey Comments.....	96

## **LIST OF ABBREVIATIONS**

CGPA	Cumulative Grade Point Average
GPA	Grade Point Average
IELTS	International English Language Testing System
TOEFL	Test of English as a Foreign Language
UCF	University of Central Florida

# **CHAPTER ONE: INTRODUCTION**

## **The Rise of International Students**

International students have come to study in the United States more than any other country due to its welcoming culture, open labor market, and quality higher education system (Zong & Batalova, 2018). In 1948, 25,464 international students studied in American universities (Institute of International Education, 2017a). Since that time, increasing numbers of international students have come to study in the United States. During the 2006/2007 school year, there were 541,324 international students in the United States, and during the 2016/2017 school year 1,078,822 international students were studying in the United States, which reflected a 99% increase during this decade (Institute of International Education, 2017b). Of those students, 747,175 are studying at doctoral granting institutions. However, the Fall 2014/2015 school year had a decline in growth of international student enrollment. This decrease was due to a variety of factors, though visa delays and denials were the main cause for this decline (Baer, 2018). Figure 1 shows the growth and decline of new international students in the United States.

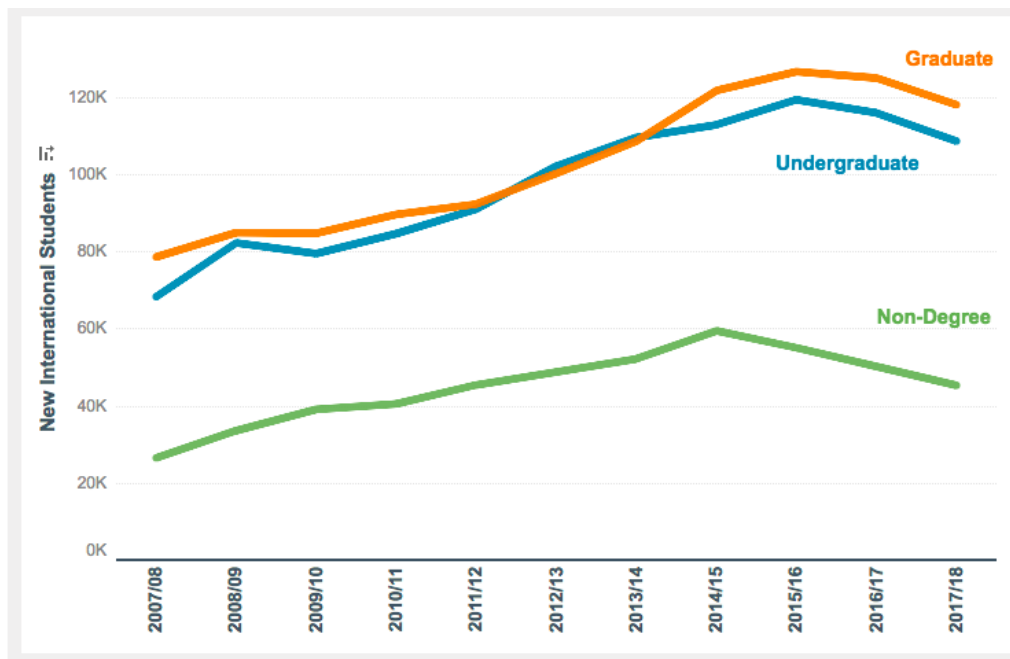


Figure 1 New International Student Enrollment, 2006/07 – 2016/17

From: Institute of International Education, 2017b

During the 2017/2018 academic year Florida was ranked seventh in the United States with regard to enrolling the most international students, with 46,516 international students studying in the state (Institute of International Education Open Doors, 2018). This study was delimited to a state public university, the University of Central Florida (UCF). During the Spring 2018 semester, there were a total of 2,420 international students at UCF. Of the 2,420 international students, 1,066 international students were in graduate programs at UCF (University of Central Florida Institutional Knowledge Management, 2018-a). The focus of this study was international graduate students at UCF. Therefore, specific details regarding undergraduate international students at UCF were not included.



## Background to the Problem

As described in the aforementioned section, a large number of international students are electing to come to study in the United States. However, international graduate students are not completing their graduate program at the same rate as domestic graduate students. In a study that compared UCF graduate international and domestic students' attrition rates, Shbeeb (2017a) found that international graduate students have an average 31.74% attrition rate during the 2012 – 2016 academic years compared to 19.51% attrition rate for domestic graduate students. Figure 2 shows the attrition rates for international and domestic graduate students at UCF during the 2012 – 2016 academic school years.

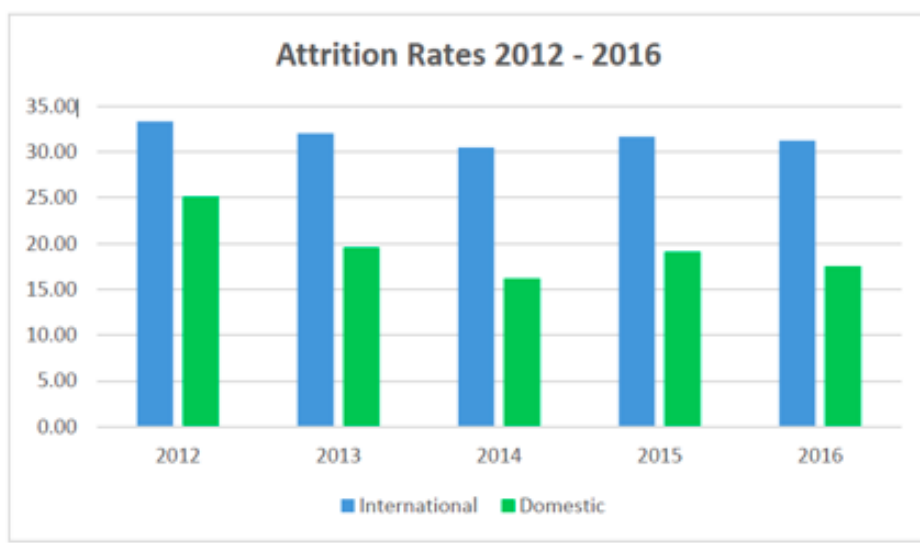


Figure 2 Graduate Students' Attrition Rates; 2012 - 2016

From: Shbeeb, 2017b

These data reveal an average difference in attrition rates of 62% when graduate international and domestic students are compared. Furthermore, this data indicate there is a problem for international graduate students being able to graduate at rates similar to those of domestic students. However, there has not been any research into the underlying cause(s) of this problem.

The main issue is the difference between international and domestic attrition rates (see above figure). One potential cause for the increased attrition rates for international students is that these students may not have sufficient proficiency in the English language to be successful in their graduate program. If UCF admits international graduate students who are not able to succeed academically due to English language limitations, this will negatively affect UCF's graduation rates for graduate students. The problem of practice that this Dissertation in Practice will address is whether or not English language test scores are indicative of an international student being able to academically succeed in a graduate program at UCF.

The phrase “academically succeed” as it relates to this dissertation is defined as a graduate student being able to maintain a grade point average (GPA) of 3.0 or higher. The graduate GPA benchmark is derived from the UCF Graduate Policies:

The graduate status GPA is used to monitor the student's progress in the program. The university requires that students must maintain a graduate status GPA of at least 3.0 or higher in order to maintain regular graduate student status, receive financial assistance, and qualify for graduation (University of Central Florida, 2018a, para. 113).

International students not able to academically succeed in graduate programs at UCF is problematic for multiple reasons, including stakeholders who have provided financial resources for a student who may not complete their degree. As tuition does not cover all of the cost required for a student enrolled in a graduate program, significant resources are potentially squandered if a student does not graduate. If this research shows that English language test scores are indicative of students' GPAs, then increasing the minimum English language test scores needed for admission to graduate programs should be considered.

### *Who is Affected*

- International students: Students from other countries often make sacrifices to come to UCF. Their commitment can involve time spent away from family and friends, financial obligations and burdens, and the stresses associated with relocating within another culture.
- UCF instructors: If an international student is not able to comprehend English at the same level as their peers, the instructor may have to modify their teaching pedagogy to ensure that the international student can understand course content.
- UCF students: The modification of instruction can negatively impact other students if an instructor must modify their vocabulary, as it will no longer be as robust as otherwise intended. Moreover, if international students are not able to participate in class due to inadequate English, then other students in the class may have a challenging time participating in group projects which include these international students. Additionally, a lack of English language proficiency on the part of some international students could potentially stifle classroom discussion.
- UCF funding stakeholders: Since the cost of education goes beyond what the student pays for tuition and fees, stakeholders may be contributing significant financial support to someone who will not earn a graduate degree.

### *Organizational Context*

This study took place at UCF during the Fall 2018 and Spring 2019 semesters. UCF is a state university located in Orlando, Florida, and was founded in 1963 (University of Central Florida, 2018b). As of Fall 2017, there were 66,183 students enrolled, with 2,481 faculty and 10,252 staff members. UCF offers 95 bachelor's programs, 87 master's programs, 28

research doctoral programs, three professional doctorates and three specialist degree programs. As of Fall 2017, there were 8,726 graduate students (including 1,109 international students) enrolled in the universities' 13 colleges (University of Central Florida, 2018c).

Admissions for international graduate students is processed through the College of Graduate Studies, in conjunction with the program(s) to which the international graduate student applied. For an international student to be accepted into a graduate program at UCF, they must first apply through the College of Graduate Studies where all information, including transcripts, test scores, and supporting documents, is submitted. The program(s) then have access to all students' submitted materials. Once all required materials have been submitted, the program makes their admission recommendations. The decision is then confirmed by the College of Graduate Studies staff.

The College of Graduate Studies works in conjunction with the graduate programs to facilitate "vision, leadership, and oversight for graduate education" (University of Central Florida, 2018d). According to the College of Graduate studies website:

Working in conjunction with the Faculty Senate Committees and the college and graduate program directors, the Graduate College is responsible for developing university-wide graduate plans and policies, coordinating graduate activities, distributing tuition support and fellowships to the colleges, facilitating the adoption of new graduate programs, coordinating the recruitment of graduate applicants, admitting graduate students to the university, ensuring that academic standards are maintained, and certifying successful completion of graduation requirements and awarding graduate degrees (University of Central Florida, 2018d).

Its mission statement includes providing “leadership and services to create high-quality learning environments for graduate students” (University of Central Florida, 2018d). It has 52 employees. The College is overseen by the Vice President for Research and Dean of the College of Graduate Studies, and the admissions side is overseen by the Associate Dean for Admissions and Recruiting. There are 22 employees who work for the College of Graduate Studies Admissions and Recruiting department. All of the departments within the College of Graduate Studies work internally with each other, as well as externally with the graduate programs (University of Central Florida, 2018e).

#### *Relationship to Other Problems*

UCF key stakeholders would like to continue increasing both student enrollment and international prominence, which are reflected in UCF’s Strategic Plan goals to increase the number of graduate students to 10,000 and to double international recognition within five years (University of Central Florida, 2017). While having high admission numbers is potentially good from a financial perspective, having high drop-out rates and students who are not able to academically succeed may reflect poorly on UCF. The increased attrition rates can affect the quality and reputation of UCF. Moreover, if an international graduate student who lacks appropriate English language skills is admitted, then this decision can diminish the number of positions available to graduate students who might be more likely to academically succeed and subsequently graduate.

## Statement of the Problem

International students at UCF are not graduating at the same rate as domestic students. One of the main differentiations between domestic and international graduate level students is their English language ability. There has not been any research conducted at UCF to determine if English language test scores are indicative of an international student's ability to succeed academically at UCF. Additionally, there has not been any research conducted at UCF to study if there is any significant GPA differences for international students who have their English language requirement waived. Furthermore, UCF international students have not been asked if they feel prepared for study with regard to their English language abilities. Therefore, investigating the aforementioned issues will help to examine whether or not the English language test scores are indicative of an international graduate student's ability to succeed academically, and if international graduate students perceive that their English language ability is sufficient for study at UCF.

## Purpose of Study

The objective of this research is to test whether or not the English language proficiency tests, which include the Test of English as a Foreign Language (TOEFL) and the International English Language Testing System (IELTS), are sufficient for international students to graduate. The specific objectives are:

1. To test if TOEFL or IELTS scores have any statistically significant relationship to international graduate students' academic success as defined by their cumulative grade point average (CGPA).

2. To assess how international graduate students feel about their TOEFL or IELTS score, and if they feel prepared for study with regards to their English language ability.

### Research Questions

The following are the research questions of the study:

1. Can the TOEFL or IELTS scores provide statistically significant predictions of international graduate students' academic success as defined by their cumulative grade point average (CGPA)?
2. Can the TOEFL and IELTS scores predict student CGPAs within different colleges?
3. What is the CGPA difference between students who took an English language test and those who had their English language requirement waived?
4. To what extent do international students feel prepared for study at UCF with regard to their English language abilities?
5. What are international students' opinions of the TOEFL and IELTS tests?

### Significance of the Study

The importance of this study is twofold. First, to test if there is a predictive validity between TOEFL or IELTS test scores and students' academic success at UCF, and second, to determine if the findings warrant a modification of the UCF English language score requirements for admission.

The issue of international graduate students having a higher attrition rate than that of domestic students is a significant problem, particularly as research has not yet identified why

this disparity exists. While English language test scores may not be the sole reason why an international student may drop out or not succeed academically, this study will ask if there is a correlation between the TOEFL and IELTS test scores and academic success.

To date, there has not been a study at UCF or in Florida that has considered if English language proficiency test scores are sufficient for an international graduate student to succeed academically in a graduate program. Currently, the UCF minimum English language test score requirements are aligned with regulations from the Florida Board of Governors and other Florida universities. The Florida Board of Governors' sets the minimum English language requirement, but then allows each university to increase their minimum score requirements. According to the Florida Board of Governors state regulation 6.009 1c (2009):

An international applicant's proficiency in English must be adequate.

International students whose first language is not English must demonstrate English language proficiency, as determined by the university. Universities may utilize various methods to determine English language proficiency, such that the method utilized to evaluate an individual student is sufficient to ensure a reasonable chance of academic success. All methods for determining English language proficiency shall be clearly outlined and included in university regulation. For those students demonstrating English language proficiency as measured by the Test of English as a Foreign Language (TOEFL), minimum scores acceptable for admission to an SUS university are 500 on the paper-based test, 173 on the computer-based test, or 61 on the iBT Internet-based test.

Universities may set higher minimum TOEFL scores for admission (para. 4).

The College of Graduate Studies is aligned with other state universities with regard to increasing the minimum English language proficiency requirement. The minimum



requirement for UCF is an 80 on the TOEFL internet-based test (iBT) or 6.5 on the IELTS (University of Central Florida, 2018f). Based on a comparison of 16 Florida universities, one university had a minimum TOEFL requirement of 83, nine had a requirement of 80, three had a requirement of 79, one had a requirement of 76, and two had a requirement of 61. Of those same 16 Florida universities, 10 required a minimum of 6.5 on the IELTS, five required a 6, and one required a 6.5, but with a listening/comprehension score of 7 (Shbeeb, 2017b). Additionally, according to U.S. News (2017) the average minimum TOEFL test score for national universities as of the 2015-2016 academic year was a 78, and the average minimum IELTS test score for national universities was a 6.3 (Ross, 2017). However, these numbers were slightly higher for national liberal arts colleges with a minimum TOEFL test score requirement of 82.2 and a IELTS test score of 6.5 (Ross, 2017).

However, not all UCF international graduate applicants are required to submit an English language test score. There are some exceptions for international graduate students having to adhere to the English language test requirement. According to the UCF international admission requirements (University of Central Florida, 2018f), the following applicants are exempt from the TOEFL or IELTS requirements:

- those who are from countries where English is the only official language;
- those who have earned a degree from a regionally accredited U.S. college or university;
- those who have earned a degree from a country where English is the only official language;
- those who have earned a degree from a university at which English is the only official language of instruction; or

- those who have successfully completed Level 4 of UCF’s Intensive English Program with a grade of “B” or better (para. 21).

Although some international graduate students are having their English language requirement waived based on the aforementioned issues, there has not been any research to determine if this is helping or hurting students academically. This study will also explore this facet of international student admission requirements.

### Definition of Terms

Academic success: A final CGPA of 3.0 or higher.

Domestic graduate student: A graduate student who is a permanent resident or citizen of the United States and who is enrolled in three or more graduate level credit hours.

Final cumulative grade point average (CGPA): The average of all of the grades during the duration of the student’s academic program.

IELTS: International English Language Testing System; an English language proficiency test that is jointly owned by the British Council, IDP: IELTS Australia and Cambridge Assessment English (International English Language Testing Service, 2018a).

International graduate student: A graduate student who is neither a resident or citizen of the United States and who requires a visa, typically an F-1 or J-1 visa to attend UCF, and is enrolled in three or more graduate level credit hours.

TOEFL: Test of English as a Foreign Language; an English language proficiency test that is owned by Educational Testing Services (ETS) (Educational Testing Service, 2018a).

### Scoring of the English Language Tests

A TOEFL total score can range between 0 and 120 and include a range of 0 - 30 for each of the listening, speaking, writing, and reading sections (Educational Testing Service, 2018b). Figure 3 outlines the sections, scores, and levels associated with the score. According to Educational Testing Service (2018b):

Skill	Score Range	Level
Reading	0-30	High (22-30) Intermediate (15-21) Low (0-14)
Listening	0-30	High (22-30) Intermediate (14-21) Low (0-13)
Speaking	0-30	Good (26-30) Fair (18-25) Limited (10-17) Weak (0-9)
Writing	0-30	Good (24-30) Fair (17-23) Limited (1-16) Score of zero (0)
<b>Total Score</b>	<b>0-120</b>	

Figure 3: TOEFL Score Chart

From: Educational Testing Service, 2018b

An IELTS total score can range between one and nine, and include whole and half numbers in the score. The IELTS test includes a listening, reading, writing, and speaking sections (International English Language Testing Service, 2018b). According to IELTS, a person who scores a six is a competent user, meaning, “The test taker has an effective command of the language despite some inaccuracies, inappropriate usage and misunderstandings. They can use and understand fairly complex language, particularly in

familiar situations” (International English Language Testing Service, 2018b, para. 5). A person who scores a seven is a good user, meaning, “The test taker has operational command of the language, though with occasional inaccuracies, inappropriate usage and misunderstandings in some situations. They generally handle complex language well and understand detailed reasoning” (International English Language Testing Service, 2018b, para. 4).

### Organization of the Study

This dissertation contains five chapters. Chapter one includes an introduction to the topic by providing background into the subject matter, explaining the rationale and purpose of the study and research questions, as well as providing information as to the scoring of the English language tests. Chapter two presents the review of recent, relevant literature including international student adjustment, TOEFL, and IELTS research. Chapter three contains an outline of the methodology that was used for the study and provides the rationale for using this methodology. Chapter four presents the findings from the data collected. The final and fifth chapter summarizes the major findings from this data and includes recommendations based on these findings.

## **CHAPTER TWO: LITERATURE REVIEW**

### **Introduction**

Since the increase of international students in the United States beginning in the 1948 school year, (Institute of International Education, 2018), research has explored facets of international students' pursuit of high education. A number of studies have focused on the cultural and academic adjustment of international students to a variety of factors, including English language test scores.

English language test scores have long been a part of university admission requirements and admission process. However, in a study conducted by Ginther and Elder (2014) in association with Education Testing Service (ETS), the author of the Test of English as a Foreign Language (TOEFL), researchers found that key admission stakeholders did not have much knowledge regarding English language tests, and that they were generally not satisfied with the English language ability of the international students. Nevertheless, when stakeholders made admission decisions, they determined if the applicant met minimum cut-off scores, but did not otherwise give the English language test scores much consideration in the admission decisions. With English language test scores being a factor in admission decisions, researchers have asked if English language proficiency tests have merit.

This literature review first summarizes articles that consider international student adjustment issues, reviews recent studies related to TOEFL, and then focuses on recent studies related to the International English Language Testing System (IELTS).

## International Student Adjustment

Attending a university in another country can be exciting, but challenging for some students. Moreover, studies have shown that the lack of English proficiency is a significant factor in international students adjusting to and doing well at English speaking universities (Andrade, 2006; Brown & Holloway, 2008; Kuo, 2011; Sümer, Poyrazli, & Grahame, 2008; Yeh & Inose, 2003; Xu, 1991). Furthermore, Andrade (2006) found that the English proficiency level was more pronounced and affected students at the graduate level more than students at the undergraduate level.

Anxiety and depression can be present in a new culture no matter the original country of a student, but Sümer, Poyrazli, and Grahame (2008) found that international students who had higher levels of anxiety and depression had lower levels of English ability. Moreover, Yeh and Inose (2003) discovered that English language fluency, social connectedness and satisfaction with their support system contributed to international students' acculturative stress. But it is not just other students and the academic material which cause adjustment difficulties for international students. Kuo (2011) found that some international students have difficulty understanding lectures due to their instructors' accent and rate of speaking English. This study was conducted at a university in a region where some professors were perceived as having strong southern accents, though it could be inferred that any professor with a strong accent may present difficulties for international students.

However, it is not just the language that can cause difficulties for international students. Wette & Furneaux (2018) found that international students in Australia and the United Kingdom had to move beyond some of their academic learning styles, specifically their writing styles, in order to assimilate into the academic cultures of their international universities (p. 196).

## Test of English as a Foreign Language

First used in 1976, the TOEFL test has developed and advanced from a paper-based test to a computer-based test, and now to an internet-based test (Educational Testing Service, 2018). According to Educational Testing Service (2018), the test is now accepted by more than 10,000 colleges, universities, governments, and programs. The TOEFL test also has world-wide recognition as it is accepted in more than 130 countries. The current TOEFL internet-based test (TOEFL iBT) was introduced in September 2005 and consists of four sections – reading, speaking, listening, and writing (Educational Testing Service, 2018, p. 3). Four hours are permitted for a test taker to complete the test.

There have been, however, conflicting research results regarding whether or not the TOEFL test is linked to international student success, reflected by their grade point average (GPA). Manganello (2011) found that the TOEFL score was not a good indicator of an international student's English proficiency, especially when they compared it to their university's internal English placement test. In another study, L. Vu and P. Vu (2013) found that while international students thought that their English language test scores were reliable and a good indicator of their academic achievement, there was little or no correlation between their TOEFL scores and their GPAs. Researchers Hill, Storch and Lynch (1999) in Australia also found that the relationship between the TOEFL score and the GPA was relatively weak and not a reliable indicator of success. Arcuino (2013) looked at international master's students from three midwestern universities in the United States and did find a correlation between TOEFL scores and GPAs, though this correlation was weak. When analyzing reports from 866 international students who attended an American university during 1987 – 2002, C. Nelson, J. Nelson, and Malone (2004) found that the TOEFL score was predictive with

regards to GPA for the first nine credit hours, but not predictive with regard to whether or not a student would graduate from their program.

Other research has indicated differing levels of correlation between English language test scores and academic success when the student's major was taken into consideration. Using a linear and logistic regression model, Wait and Gressel (2009) found that engineering students had less of a relationship between TOEFL and academic performance than did students in majors such as business and the arts. As such, they suggest having program-specific admission requirements. Similarly, Bridgeman, Cho, and DiPietro (2016) found that it was important to group the TOEFL and GPA scores by major. In another study published by ETS, Cho and Bridgeman (2012) reviewed the performance of 2,594 undergraduate and graduate students at 10 United States universities. Utilizing a correlation based analysis and expectancy graphs, they found that the predictive validity correlation between TOEFL scores and academic performance of the students was small, but slightly higher within some graduate level disciplines.

Other studies have shown that a review at the sub-score level may be useful. Ginther and Yan (2018) explored the predictive validity of Chinese students TOEFL scores and first year GPAs at Purdue University. They found that low TOEFL sub-scores are correlated with low GPAs, though the university requires a minimum score of 18 on each of the sub-sections. In another ETS study, researchers Harsch, Ushioda, and Ladroue (2017) examined the correlation between TOEFL scores and students' success at a university in the United Kingdom. They found that students who received high scores on TOEFL subgroups tended to do better academically, and the students who had lower TOEFL sub-scores were more likely to fail a class or have lower grades. Additionally, they found it beneficial for departments to set their own scores based on the English language rigor necessary for their content area.



Overall, researchers had conflicting findings regarding the relationship between TOEFL scores and academic success. If a relationship was found between TOEFL scores and GPAs, it was often a weak correlation. However, based on the aforementioned articles, it does appear that when utilizing the sections of the TOEFL test and differentiating between majors, the scores and GPAs had a relatively strong correlation.

### International English Language Testing System

The International English Language Testing System (IELTS) began more than 25 years ago and is currently used by more than 20,000 organizations, universities, governments, and employers in 130 countries (International English Language Testing Service, 2018a). The IELTS test contains four sections which include listening, reading, writing and speaking and takes approximately two hours and 44 minutes to complete (International English Language Testing Service, 2019).

Researchers have looked at various aspects of the IELTS test. Woodrow (2006) explored different variables related to an international student's academic success and found that the IELTS score had a moderate correlation to an international student's first semester GPA. In a related study, Yen and Kuzma (2009) found a positive correlation between University of Worcester's international Chinese students' IELTS scores and their first and second semester GPAs. Furthermore, they found that if an international student had relatively lower IELTS Listening and Writing scores, as compared to other sections of the IELTS test, then they were more likely not to do as well academically.

Comparable to the TOEFL, researchers who have studied the IELTS have found that students with minimum scores on particular subsections are predicted to do better academically. Feast (2002) found a significant but slight positive correlation between the

IELTS and GPA for 101 international students in Australia. They asked if raising the IELTS score requirement needed for admission would reduce the potential number of international students, and found that the score requirement could have an impact on the number of students applying. However, they found that it would be beneficial to keep the minimum IELTS score at 6.0, but to raise the minimum Reading and Writing subsections to 6.5 at the graduate level. Furthermore, Bayliss and Ingram (2006) found that IELTS scores can predict an international student's English success within the first six months of them studying at a university. However, they did recommend that some programs that required a higher level of spoken English, such as medical sciences, should consider raising the minimum IELTS score requirements. They also noted that programs that had a higher writing rigor should consider having higher minimum scores for acceptance – that scores less than 6.0 would not be sufficient for international students in those fields. At odds with the other studies and utilizing predictive validity, Schoepp (2018) explored 953 undergraduate students at an English medium university in the United Arab Emirates and found that the IELTS score was a predictor of academic performance. The difference in results could be attributed to the fact that the study was conducted at an English medium university, where most of the students' native language is not English.

In a research report funded by IELTS and conducted by Arrigoni and Clark (2015), the researchers explored the IELTS scores of students taking English language and rhetoric courses at the American University in Cairo, Egypt. They found that there was an overall weak correlation between IELTS scores and GPAs. They suggested that the lack of correlation indicated that a student's achievement had a stronger relationship with other factors such as academic preparedness. Furthermore, they pointed out that IELTS was a demonstration of a student's ability at one time, whereas a grade from a given semester

demonstrated a student's ability to perform throughout a semester (p. 24). Arcuino (2013) did not find any statistical significance between IELTS scores and GPAs, although it was noted that the lack of correlation could be due to the small sample size.

In sum, researchers have explored a variety of factors when it comes to the IELTS test and international students' academic success. Most relevant recent research has shown that there is a positive correlation between IELTS scores and GPAs. Researchers have often suggested that having minimum section score requirements would be beneficial for helping to ensure international students' academic success. Furthermore, researchers have recommended modifying IELTS requirements based on the English rigor of the program. Therefore, research has concluded that setting the IELTS score requirement is not a simple or universal determination. Moreover, there are a variety of factors that should be addressed when assessing and setting the IELTS score admission requirements.

## **CHAPTER THREE: METHODOLOGY**

### **Introduction**

In this chapter the following items will be addressed in order to explain the methodology for this mixed methods research: (a) research questions, (b) research design and rationale, (c) research setting and participants, (d) data collection and instrumentation, and (d) data analyses. The objective of this research is to test whether or not the English language proficiency tests which include the Test of English as a Foreign Language (TOEFL) and the International English Language Testing System (IELTS), are sufficient for international students to graduate. The specific objectives are:

1. To test if TOEFL or IELTS scores have any statistically significant relationship to international graduate students' academic success as defined by their cumulative grade point average (CGPA).
2. To assess how international graduate students feel about their TOEFL or IELTS score, and if they feel prepared for study with regards to their English language ability.

### **Research Questions**

The following are the five research questions that were sought to direct the study and answer the objectives:

1. Can the TOEFL or IELTS scores provide statistically significant predictions of international graduate students' academic success as defined by their cumulative grade point average (CGPA)?
2. Can the TOEFL and IELTS scores predict student CGPAs within different colleges?

3. What is the CGPA difference between students who took an English language test and those who had their English language requirement waived?
4. To what extent do international students feel prepared for study at UCF with regard to their English language abilities?
5. What are international students' opinions of the TOEFL and IELTS tests?

### Research Design and Rationale

A combination of quantitative and qualitative research methods were used for this study. Quantitative data consisted of retrieved archived international graduate student data. For the qualitative section, a survey of current international graduate students was utilized for this study. The retrieved international student data allowed for a larger collection of international graduate student data throughout the course of four academic years. The retrieved data allowed for unbiased and factual information to be presented, without potential bias from the international students or the researcher. The anonymous survey allowed for current international graduate students to give their opinions and feelings regarding the English language proficiency tests and their assessment of their level of English proficiency. As the retrieved data cannot show feelings or opinions, the retrieved data and survey questions were combined in order to obtain a more robust and comprehensive understanding of the research results.

### Research Setting and Participants

Approval was sought and received from the Institutional Review Board at the University of Central Florida (see appendix A). The research for this mixed methods study

took place at UCF during the Fall 2018 and Spring 2019 semesters. UCF is a public university located in Orlando, Florida, and as of the Fall 2017 semester there were 66,180 students enrolled, 8,721 of whom were graduate students (University of Central Florida Institutional Knowledge Management, 2018-b). Of the graduate students, 1,109 students were classified as international.

### Data Collection and Instrumentation

A mixed methods approach that included the collection of data received from the College of Graduate Studies and an online survey (see appendix B) was used to collect data for this study.

A mixed methods approach for this study included the collection of data received from the College of Graduate Studies and an online survey (see appendix B). The first section of the study involved the collection of data from an employee in the College of Graduate Studies. Data were obtained on international students who had a visa and who were enrolled in a graduate program at UCF at any time during the 2012 – 2016 academic years. A total of 1,661 international students had enrolled in one or more semesters during this time period, and 647 of these students graduated and had CGPAs listed. Of those 647, 64 had CGPA's too low to meet graduation requirements. Therefore, data points below a 2.8 GPA were removed.

The second section involved a survey that took place during the Fall 2018 semester. The participants for the survey were international students who were on an F or J visa and were enrolled in three or more credit hours during the Fall 2018 semester. The F and J visas at UCF are for international students who are pursuing full-time, degree seeking programs (University of Central Florida, 2018g). The survey was sent to 1,269 international students, and of the 279 students that started the survey, 235 completed the entire survey.

### *Retrieved Graduate Data*

Data compiled throughout the international student's academic career and stored in the College of Graduate Studies' database management system were collected by a UCF employee. Data were obtained on international students on any visa who were enrolled in a graduate program at UCF at any time during the 2012 – 2016 academic years. The information included the student's program, graduating GPA, GPAs each semester, whether or not the students were funded, the country and citizenship they listed, visa type, English language test scores and subsection scores, and whether or not their English language proficiency test was waived. For the purpose of this study, only international graduate students who had a graduating GPA were assessed, and only the student's program, their graduating GPA, English language test scores, and English waiver were used in the study. A total of 1,661 international students had enrolled in one or more semesters throughout the 2012 – 2016 academic years. Of the international students that had CGPA's of 2.75 or higher, 115 of those students had their English language score waived, but 36 of those students also submitted a TOEFL or IELTS test. As a result, the data points of those that submitted an English language test while also having their English language requirement waived were included in the calculations of research questions one through three. Additionally, two international students submitted both TOEFL and IELTS scores, and these data points were included in all relevant calculations and analyses. It should be noted that some of the TOEFL scores were taken and submitted through the TOEFL Computer-based test, as opposed to the majority of scores that were taken and submitted using the TOEFL Internet-based test. In order to maintain consistency, the Computer-based test scores were converted to the Internet-

based test scores using the TOEFL Internet-based Test Score Comparison Tables (Educational Testing Service, 2005).

### *Survey*

A survey using the Qualtrics online platform was also used for the study. The survey was sent to UCF international students who were on an F or J visa and enrolled in three or more graduate credit hours during the Fall 2018 semester. The request to participate in the survey was sent via email on September 18, 2018, and a reminder email was sent to students who had not yet responded by October 1, 2018 with a request to participate. The 17-question survey was sent to 1,269 international students, of whom 279 students began, and 235 students completed the survey. The survey was anonymous and did not include any names or other identifying information. The survey asked students questions related to their English language test scores, their opinions of the TOEFL and IELTS tests, and whether or not they felt prepared for study at UCF given their English language proficiency. The survey questions were of mixed types – including closed-ended questions, five value Likert-scale questions, and an open-ended question.

### *Data Analysis*

The data collected were analyzed using linear regression analysis, descriptive statistics, and thematic analysis. The following table outlines the research questions, the data that were used for the research question, and the analysis that was used to answer the research question.



Table 1: Research Questions, Data Collection, and Data Analysis

<b>Research Question</b>	<b>Data Collection</b>	<b>Data Analysis</b>
1. Can the TOEFL or IELTS scores provide statistically significant predictions of international graduate students' academic success as defined by their cumulative grade point average (CGPA)?	Retrieved UCF data – CGPA and TOEFL/IELTS total scores	Linear regression analysis - descriptive statistics, assumption checks, regression statistics, ANOVA, confidence level, scatter plot, and linear regression
2. Can the TOEFL and IELTS scores predict student CGPAs within different colleges?	Retrieved UCF data – CGPA and TOEFL/IELTS total scores differentiated by college	Linear regression analysis - descriptive statistics, assumption checks, regression statistics, ANOVA, confidence level, scatter plot, and linear regression
3. What is the CGPA difference between students who took an English language test and those who had their English language requirement waived?	Retrieved UCF data – CGPA of students who took TOEFL/IELTS and CGPA of students who had their test waived	Levene's Test for equality of variances and Independent samples test
4. To what extent do international students feel prepared for study at UCF with regard to their English language abilities?	Qualtrics survey – Likert scale questions and open ended question	Descriptive statistics
5. What are international students' opinions of the TOEFL and IELTS tests?	Qualtrics survey – Likert scale questions and open-ended question	Descriptive statistics and thematic analysis

To answer questions one and two, the data were analyzed using regression analysis tools in Excel. Descriptive statistics, assumption checks, regression statistics, ANOVA, confidence level, and scatter plot and linear regressions were performed to obtain analysis results. The outputs of the tools were used to determine whether or not the data met the normality tests, and whether or not the data showed any predictions of a relationship between the test scores and academic success.

The third question utilized the retrieved data to compare the CGPAs of international students who had their English language test scores waived against those who were required to take the test. Using the Levene's test for equality of variance and the Independent Samples test calculations in Excel, the CGPAs were compared in order to analyze whether or not there was any relationship between the two variables.

In order to analyze the survey questions related to international students' opinions (research questions four and five), the Likert-scale responses were examined using descriptive statistics. Additionally, in order to examine the open ended-question allowing students to provide further comments or opinions, Braun and Clarke's (2006) six-phase framework was used. The six phases included: (a) become familiar with data, (b) generalize initial codes, (c) search for themes, (d) review themes, (e) define themes, and (f) write-up themes.

### Summary

This chapter explains the methodology of the research. The research questions that were used to explore the objectives of this study were outlined, followed by the description of the research design. The next section expounded on the research setting and participants that were involved in the study, followed by an overview of the data collection methods and instrumentation. The last section described the data analyses where a table that outlined the research questions, data collection methods, and data analyses methods was presented.

## **CHAPTER FOUR: RESEARCH FINDINGS**

### **Introduction**

This chapter describes the results from the research. First, the purpose of the study will be reiterated, followed by an overview of the research questions. The retrieved data results will be presented, followed by a description of the participants for research questions one and two, an overview of the assumption checks for questions one and two, analyses of the data, assumptions, and results. For research question three, a description of the participants is outlined, followed by the list of reasons as to why their English language requirement was waived. Next, the assumption checks were explained. The section for research question three includes the results and analysis from the independent-samples t-test. The following section includes the results from the survey – research questions four and five. This section begins with the description of the participants, followed by analyses of the data collected from research questions four and five. The final section includes a brief summary of the aforementioned items.

### **Purpose of the Study**

The objective of this research was to test if the scores in the English language proficiency tests – Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS) – are sufficient for international students to graduate. The specific objectives were:

1. To test if TOEFL or IELTS scores have any statistically significant relationship to international graduate students' academic success as defined by their cumulative grade point average (CGPA).

2. To assess how international graduate students feel about their TOEFL or IELTS score, and if they feel prepared for study with regards to their English language ability.

### Research Questions

The following research questions were analyzed to achieve the study's objectives:

1. Can the TOEFL or IELTS scores provide statistically significant predictions of international graduate students' academic success as defined by their cumulative grade point average (CGPA)?
2. Can the TOEFL and IELTS scores predict CGPA within different colleges?
3. What is the CGPA difference between students who took an English language test and those who had their English language requirement waived?
4. To what extent do international students feel prepared for study at UCF with regard to their English language abilities?
5. What are international students' opinions of the TOEFL and IELTS tests?

### Data Results

#### *Description of Participants for Questions One and Two*

The archived data used were collected with help from a UCF College of Graduate Studies employee. The data included academic information on UCF students who were on any visa and enrolled in at least one semester during the Spring 2012 – Fall 2016 semesters.

## Assumption Checks

For questions one and two, the following assumption checks were evaluated to test whether or not the linear regression model was appropriate for using English language test scores to predict CGPAs.

1. **Normality:** The normality of the data were assessed by examining the skewness and kurtosis of the CGPA and test scores. As suggested by Hahs-Vaughn (2017, pp. 99), if the skewness statistic of the residuals was within the range considered normal – an approximate absolute value of 2.0 for skew and 7.0 for kurtosis – then the data would suggest some evidence of normality. The results indicated that all of the data sets fell within the normal acceptable range. Therefore, all of the data sets met the normality tests.
2. **Linearity:** The linearity of the data were assessed in order to determine whether or not there was a linear relationship between the CGPA and English language test scores. In order to test the linearity of the data, a scatterplot was created. Through visual inspections, the linearity was analyzed. The results indicated that there was no linear relationship between any of the CGPAs and English language test scores.
3. **Homoscedasticity:** The homoscedasticity of the data was assessed in order to determine whether or not the residuals was constant across the independent variables. The data were found to be heteroscedastic rather than homoscedastic, as assessed by visual inspection of a plot of standardized residuals versus standardized predicted values. However, no transformations were applied for the analysis to avoid complicity of the interpretation, so the results may not be accurate.

### Research Question One

1. Can the TOEFL or IELTS scores provide statistically significant predictions of international graduate students' academic success as defined by their cumulative grade point average (CGPA)?

#### *Data Analysis for Research Question One*

##### TOEFL and CGPA

The following analysis represents the predictions of TOEFL and CGPA. The sample consisted of data points representing the TOEFL and CGPA of 390 international students who graduated between the Spring 2012 and Fall 2016 academic semesters. The average TOEFL total score was 92.53. The data contained CGPAs that were too low to meet graduation requirements; therefore, data points below 2.8 were removed as indicated with the condensed data set.

Table 2: Descriptive Statistics of TOEFL Scores and CGPAs

TOEFL Score		CGPA	
Mean	93.43	Mean	3.66
Standard Error	0.55	Standard Error	0.01
Median	93	Median	3.70
Mode	90	Mode	4
Standard Deviation	10.90	Standard Deviation	0.27
Sample Variance	118.80	Sample Variance	0.07
Kurtosis	-0.40	Kurtosis	-0.06
Skewness	-0.02	Skewness	-0.76
Range	53	Range	1.25
Minimum	66	Minimum	2.75
Maximum	119	Maximum	4
Sum	36439	Sum	1428.37
Count	390	Count	390

### *Assumption Checks*

**Normality:** For the TOEFL scores, the skewness of the statistic of the residuals was -0.02 and kurtosis was -0.02. For the CGPAs, the skewness of the statistic of the residuals was -0.76 and kurtosis was -0.06. Both skew and kurtosis were within the range considered normal (an approximate absolute value of 2.0 for skewness and 7.0 for kurtosis), suggesting some evidence of normality.

**Linearity:**

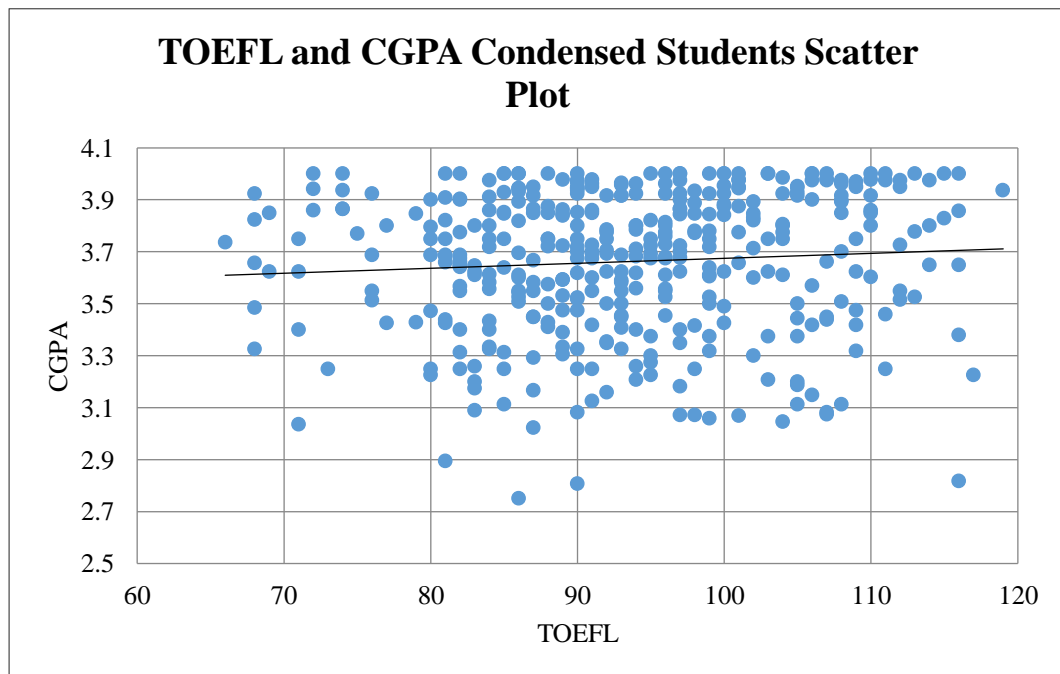


Figure 4: TOEFL and CGPA Condensed Students Scatter Plot

Figure 4 represents the TOEFL scores and CGPAs for international students who graduated between Spring 2012 and Fall 2016. A scatterplot of TOEFL scores and CGPAs was created. Visual inspection of this scatterplot indicated that there was no linear relationship between the variables.

**Homoscedasticity:** The data were heteroscedastic rather than homoscedastic, as assessed by visual inspection of a plot of standardized residuals versus standardized predicted values.

However, no transformations were applied during the analysis, so the results may not be accurate. Since the assumptions of linear regression were not met, a linear regression model could not be used to predict students' CGPAs based on their TOEFL scores.

### *Data Analysis Results*

Table 3: TOEFL Scores and CGPAs Regression Statistics

Regression Statistics	
Multiple R	0.08
R Square	0.01
Adjusted R Square	0.01
Standard Error	0.27
P-value	0.13
Observations	390

Table 4: TOEFL Scores and CGPAs ANOVA

	df	SS	MS	<i>F</i>	<i>p</i>
Regression	1	0.17	0.17	2.33	0.13
Residual	388	28.28	0.07		
Total	389	28.44			

Table 5: TOEFL Scores and CGPAs Confidence Level

	$\beta$	<i>SE</i>	<i>t</i>	<i>p</i>	<i>Lower 95% CI</i>	<i>Upper 95% CI</i>
Intercept	3.48	0.12	29.49	0.00	3.25	3.73
TOEFL	>0.01	>0.01	1.52	0.13	0.01	0.01

A linear regression analysis revealed that TOEFL scores could not predict CGPAs with statistical significance with  $F(1, 388) = 2.33, p = 0.13$  (See Table 4) and the TOEFL scores accounted for less than 0.01% of the explained variability in the CGPA. The regression equation indicated the predicted CGPA =  $3.48 + 0.01 \times \text{TOEFL}$ . At the 95% level



of confidence for the TOEFL scores, the confidence interval for the slope was (0.01, 0.01).

(See Table 5)

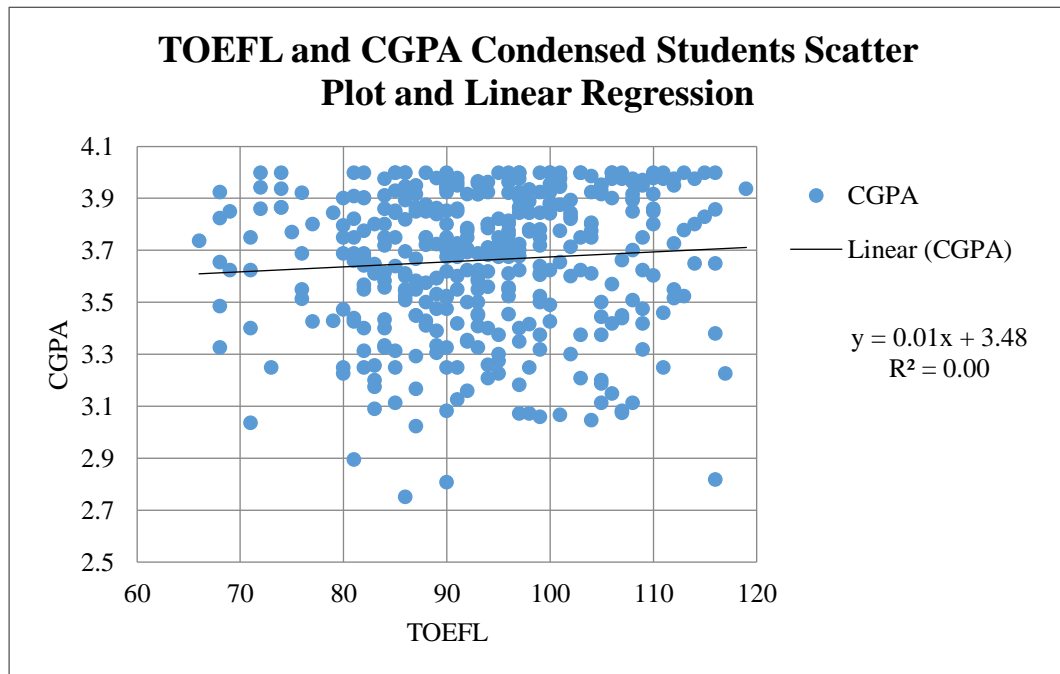


Figure 5: TOEFL and CGPA Condensed Students Scatter Plot and Linear Regression

Figure 5 represents the TOEFL scores and CGPAs for international students who graduated between Spring 2012 and Fall 2016. The test for normality was met, the test for homoscedasticity was not met, and the test for linearity was not met. As a result, the TOEFL scores cannot be used to predict the CGPAs for international students.

### IELTS and CGPA

The following analysis examines whether IELTS scores can accurately predict CGPAs. The sample consisted of the IELTS and CGPA data points for 147 international students who graduated between the Spring 2012 and Fall 2016 academic semesters.

Table 6: Descriptive Statistics of IELTS Scores and CGPAs

IELTS		CGPA	
Mean	6.80	Mean	3.63
Standard Error	0.04	Standard Error	0.03
Median	6.5	Median	3.75
Mode	6.5	Mode	4
Standard Deviation	0.54	Standard Deviation	0.34
Sample Variance	0.30	Sample Variance	0.11
Kurtosis	1.70	Kurtosis	0.20
Skewness	-0.27	Skewness	-0.85
Range	3.5	Range	1.54
Minimum	4.5	Minimum	2.46
Maximum	8	Maximum	4
Sum	999.5	Sum	534.20
Count	147	Count	147

#### *Assumption Checks*

**Normality:** For the IELTS score, the skewness of the statistic of the residuals was -0.27 and kurtosis was 1.70. For the CGPA, the skewness of the statistic of the residuals was -0.85 and kurtosis was 0.20. Both skewness and kurtosis were within the range considered normal (an approximate absolute value of 2.0 for skew and 7.0 for kurtosis), suggesting some evidence of normality.

### Linearity:

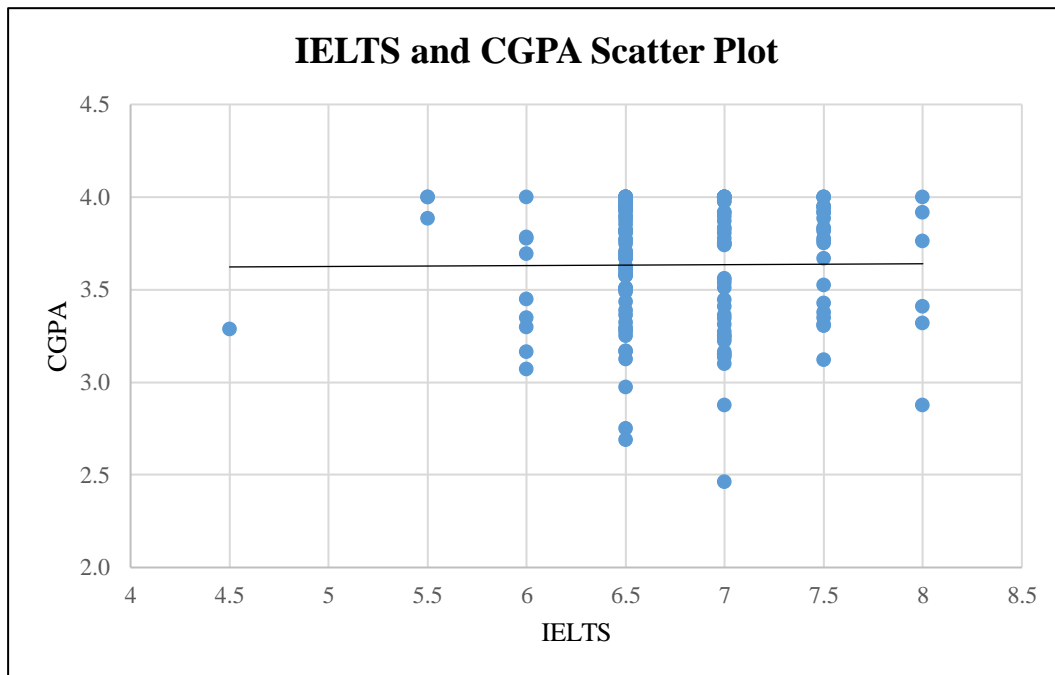


Figure 6: IELTS and CGPA Scatter Plot

Figure 6 represents the IELTS and CGPA scores for international students who graduated between Spring 2012 and Fall 2016. A scatterplot of IELTS scores and CGPAs was created. Visual inspection of this scatterplot indicated that there was no linear relationship between the variables.

**Homoscedasticity:** The data were heteroscedastic rather than homoscedastic, as assessed by visual inspection of a plot of standardized residuals versus standardized predicted values. However, no transformations were applied during the analysis, so the results may not be accurate. Since the assumptions of linear regression were not met, a linear regression model could not be used to predict students' CGPAs based on their IELTS scores.

## Data Analysis Results

Table 7: IELTS Scores and CGPA Regression Statistics

Regression Statistics	
Multiple R	0.01
R Square	0.01
Adjusted R Square	-0.01
Standard Error	0.34
P-value	0.92
Observations	147

Table 8: IELTS Scores and CGPA ANOVA

	df	SS	MS	F	<i>p</i>
Regression	1	>0.01	>0.01	0.01	0.92
Residual	145	16.43	0.11		
Total	146	16.43			

Table 9: IELTS Scores and CGPA Confidence Level

	$\beta$	<i>SE</i>	<i>T</i>	<i>p</i>	<i>Lower 95% CI</i>	<i>Upper 95% CI</i>
Intercept	3.60	0.35	10.32	4.55	2.91	4.29
IELTS	>0.01	0.05	0.10	0.92	-0.10	0.11

A linear regression analysis revealed that IELTS scores could not predict CGPAs with statistical significance with  $F(1, 145) = 0.01$ ,  $p = 0.92$  (See Table 8) and the IELTS scores accounted for less than 0.01% of the explained variability in the CGPA. The regression equation indicated the predicted CGPA =  $3.60 + 0.01 \times \text{IELTS}$ . At the 95% level of confidence for the IELTS scores, the confidence interval for the slope was (-0.10, 0.11). (See Table 9)

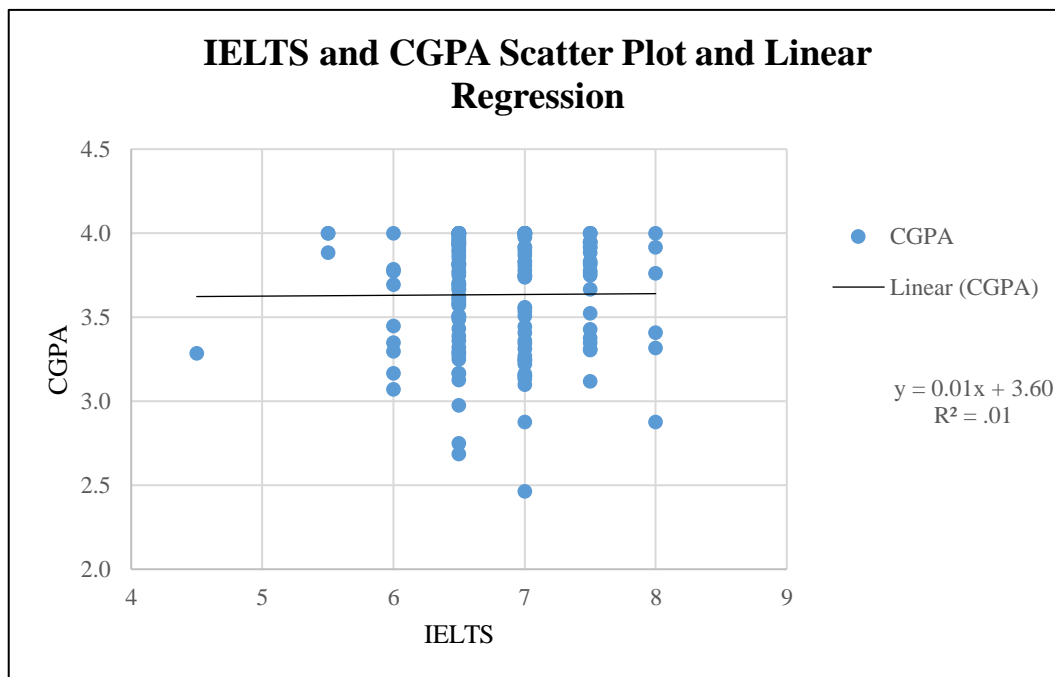


Figure 7: IELTS and CGPA Scatter Plot and Linear Regression

Figure 7 represents the IELTS scores and CGPAs for international students who graduated between Spring 2012 and Fall 2016. The test for normality was met, the test for homoscedasticity was not met, and the test for linearity was not met. As a result, the IELTS scores cannot be used to predict the CGPAs for international students.

### Research Question Two

Can the TOEFL and IELTS scores predict student CGPAs within different colleges?

#### *Data Analysis for Research Question Two*

As discussed in the literature review, some researchers have indicated that there may be a correlation between the English language tests and disciplines (Bayliss & Ingram, 2006; Bridgeman, Cho & DiPietro, 2016; Cho & Bridgeman, 2012; Wait & Gressel, 2009). For this

question, the retrieved data were divided by the English language test and by colleges.

For the TOEFL test, there were 10 colleges included in the data, though the College of Graduate Studies only had one student, so a graph was not included for that College. Note that during 2018 UCF restructured the colleges, and thus for continuity the colleges listed in the graphs below retained their titles prior to the restructuring. The following table represents the sample by colleges.

Table 10: College English Language Test Sample

<b>College</b>	<b>TOEFL Sample</b>	<b>IELTS Sample</b>
College of Arts and Humanities	20	3
College of Business	11	0
College of Education and Human Performance	13	1
College of Engineering and Computer Science	261	38
College of Health and Public Affairs	7	5
College of Optics and Photonics	18	1
College of Medicine	6	0
College of Sciences	31	4
Rosen College of Hospitality Management	23	4

## TOEFL Scores by College

The following analysis represents the prediction of CGPAs by TOEFL scores by college.

### College of Arts and Humanities TOEFL Scores and CGPAs

The first sample consisted of data points representing the TOEFL and CGPA of 20 international students who graduated from the College of Arts and Humanities between the Spring 2012 and Fall 2016 academic semesters.

Table 11: Descriptive Statistics of TOEFL Scores and CGPAs for the College of Arts and Humanities

TOEFL Score		CGPA	
Mean	98.3	Mean	3.79
Standard Error	3.76	Standard Error	0.05
Median	99.5	Median	3.89
Mode	88	Mode	3.98
Standard Deviation	16.79	Standard Deviation	0.21
Sample Variance	282.01	Sample Variance	0.04
Kurtosis	5.96	Kurtosis	-0.92
Skewness	-1.98	Skewness	-0.76
Range	74	Range	0.63
Minimum	42	Minimum	3.38
Maximum	116	Maximum	4
Sum	1966	Sum	75.89
Count	20	Count	20

### *Assumption Checks*

**Normality:** For the TOEFL score, the skewness of the statistic of the residuals was -1.98 and kurtosis was 5.96. For the CGPA, the skewness of the statistic of the residuals was -0.76 and kurtosis was -0.92. Both skewness and kurtosis were within the range of what is considered normal (an approximate absolute value of 2.0 for skew and 7.0 for kurtosis), suggesting some evidence of normality.

**Linearity:**

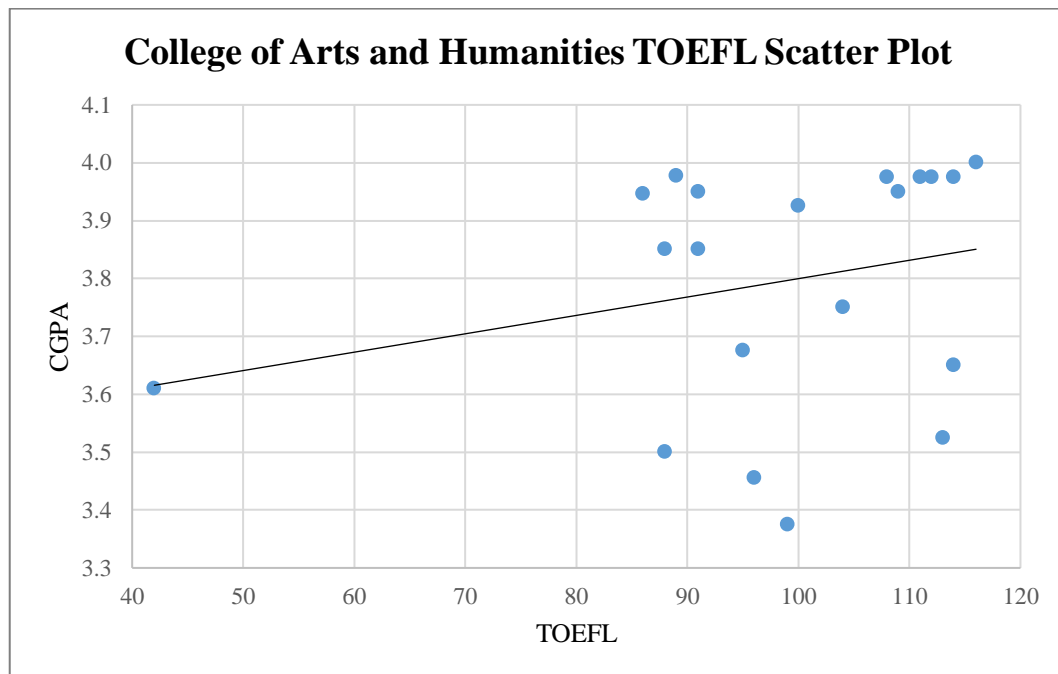


Figure 8: College of Arts and Humanities TOEFL Scatter Plot

Figure 8 represents the TOEFL scores and CGPAs of international students who graduated between Spring 2012 and Fall 2016 in the College of Arts and Humanities. A scatterplot of TOEFL scores and CGPAs was created. Visual inspection of this scatterplot indicated that there was no linear relationship between the variables.

**Homoscedasticity:** The data were heteroscedastic rather than homoscedastic, as assessed by visual inspection of a plot of standardized residuals versus standardized predicted values.



However, no transformations were applied during the analysis, so the results may not be accurate. Since the assumptions of linear regression were not met, a linear regression model could not be used to predict students' CGPAs based on their TOEFL scores within the College of Arts and Humanities.

### *Data Analysis Results*

Table 12: TOEFL Scores and CGPA College of Arts and Humanities Regression Statistics

Regression Statistics	
Multiple R	0.26
R Square	0.07
Adjusted R Square	0.01
Standard Error	0.21
P-value	0.28
Observations	20

Table 13: TOEFL Scores and CGPA of College of Arts and Humanities ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>P</i>
Regression	1	0.05	0.05	1.27	0.28
Residual	18	0.77	0.04		
Total	19	0.82			

Table 14: TOEFL Scores and CGPA of College of Arts and Humanities Confidence Level

	$\beta$	<i>SE</i>	<i>t</i>	<i>p</i>	<i>Lower 95% CI</i>
Intercept	3.48	0.28	0.00	2.89	4.07
TOEFL	0.01	0.00	0.28	0.01	0.01

A linear regression analysis revealed that TOEFL scores could not predict CGPAs with statistical significance with  $F(1, 18) = 0.01$ ,  $p = 1.27$  (See Table 13) and the TOEFL scores accounted for 0.07% of the explained variability in the CGPA. The regression equation indicated the predicted CGPA score =  $3.48 + 0.01 \times \text{TOEFL}$ . At the 95% level of

confidence for TOEFL scores, the confidence interval for the slope was (0.01, 0.01). (See Table 14)

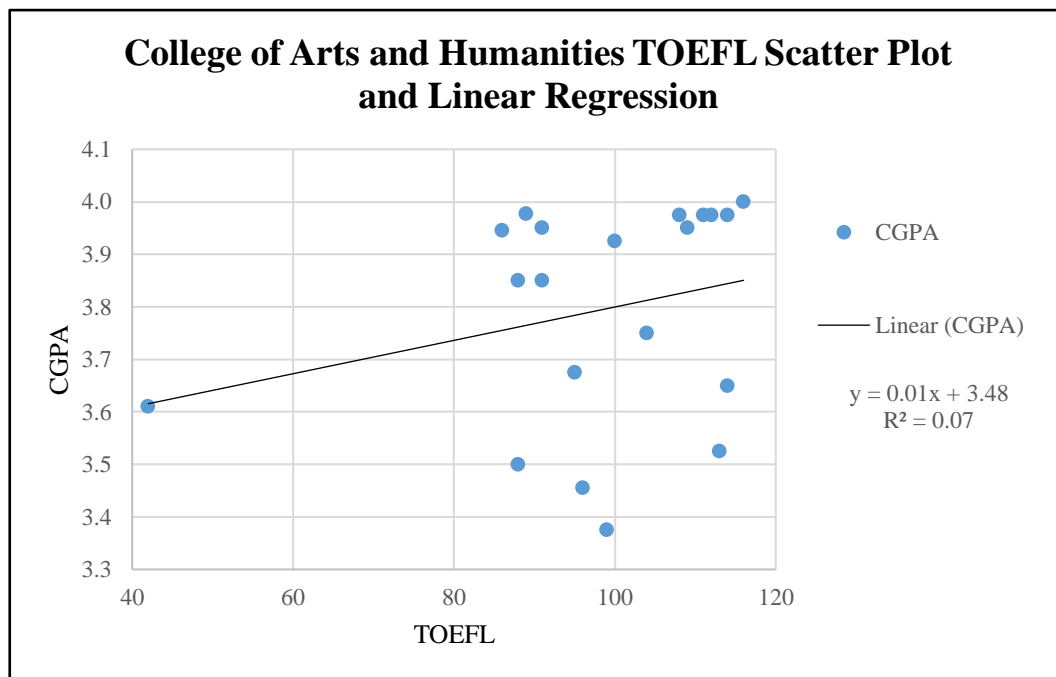


Figure 9: College of Arts and Humanities TOEFL Scatter Plot and Linear Regression

Figure 9 represents the TOEFL scores and CGPAs of international students who graduated during the Spring 2012 and Fall 2016 semesters from the College of Arts and Humanities. The test for normality was met, the test for homoscedasticity was not met, and the test for linearity was not met. As a result, the TOEFL scores cannot be used to predict the CGPAs for international students within the College of Arts and Humanities.

#### College of Business TOEFL Scores and CGPAs

The next sample consisted of data points representing the TOEFL scores and CGPAs of 11 international students who graduated from the College of Business between the Spring 2012 and Fall 2016 academic semesters.

Table 15: Descriptive Statistics of TOEFL Scores and CGPAs for the College of Business

TOEFL Score		CGPA	
Mean	100.09	Mean	3.73
Standard Error	1.99	Standard Error	0.08
Median	98	Median	3.84
Mode	98	Mode	3.85
Standard Deviation	6.61	Standard Deviation	0.27
Sample Variance	43.69	Sample Variance	0.07
Kurtosis	-1.22	Kurtosis	2.91
Skewness	-0.10	Skewness	-1.66
Range	19	Range	0.91
Minimum	90	Minimum	3.07
Maximum	109	Maximum	3.98
Sum	1101	Sum	40.98
Count	11	Count	11

#### *Assumption Checks*

**Normality:** For the TOEFL score, the skewness of the statistic of the residuals was -0.10 and kurtosis was -1.22. For the CGPA, the skewness of the statistic of the residuals was -1.66 and kurtosis was 2.91. Both skewness and kurtosis were within the range considered normal (an approximate absolute value of 2.0 for skew and 7.0 for kurtosis), suggesting some evidence of normality.

**Linearity:**

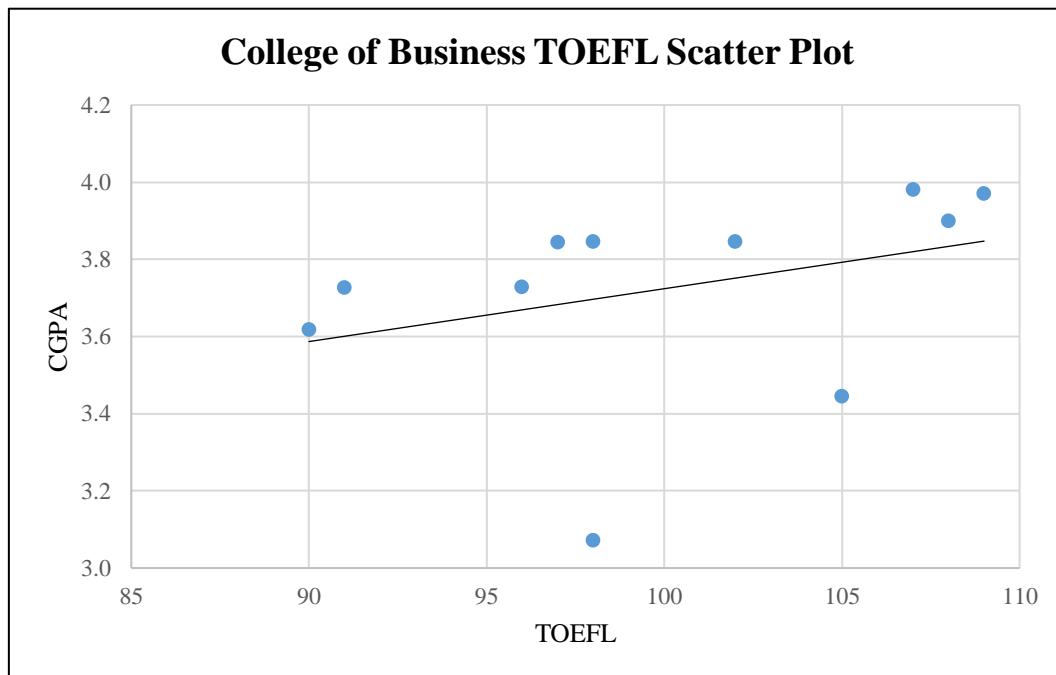


Figure 10: College of Business TOEFL Scatter Plot

Figure 10 represents the TOEFL scores and CGPAs of international students who graduated between Spring 2012 and Fall 2016 in the College of Business. A scatterplot of TOEFL scores and CGPAs was created. Visual inspection of this scatterplot indicated that there was no linear relationship between the variables.

**Homoscedasticity:** The data were heteroscedastic rather than homoscedastic, as assessed by visual inspection of a plot of standardized residuals versus standardized predicted values. However, no transformations were applied during the analysis, so the results may not be accurate. Since the assumptions of linear regression were not met, a linear regression model could not be used to predict students' CGPAs based on their TOEFL scores within the College of Business.

## Data Analysis Results

Table 16: TOEFL Scores and CGPA College of Business Regression Statistics

Regression Statistics	
Multiple R	0.34
R Square	0.11
Adjusted R Square	0.02
Standard Error	0.27
P-value	0.31
Observations	11

Table 17: TOEFL Scores and CGPA of College of Business ANOVA

	df	SS	MS	F	<i>p</i>
Regression	1	0.08	0.08	1.16	0.31
Residual	9	0.63	0.07		
Total	10	0.72			

Table 18: TOEFL Scores and CGPA of College of Business Confidence Level

	$\beta$	<i>SE</i>	<i>t</i>	<i>p</i>	<i>Lower 95% CI</i>	<i>Upper 95% CI</i>
Intercept	2.35	1.27	1.85	0.10	-0.53	5.23
TOEFL	0.01	0.01	1.08	0.31	-0.02	0.04

A linear regression analysis revealed that TOEFL scores could not predict CGPAs with statistical significance, with  $F(1, 9) = 0.01$ ,  $p = 1.16$  (See Table 17) and the TOEFL scores accounted for 0.11% of the explained variability in the CGPA. The regression equation indicated the predicted CGPA =  $2.35 + 0.01 \times \text{TOEFL}$ . At the 95% level of confidence for TOEFL scores, the confidence interval for the slope was (-0.02, 0.04). (See Table 18)

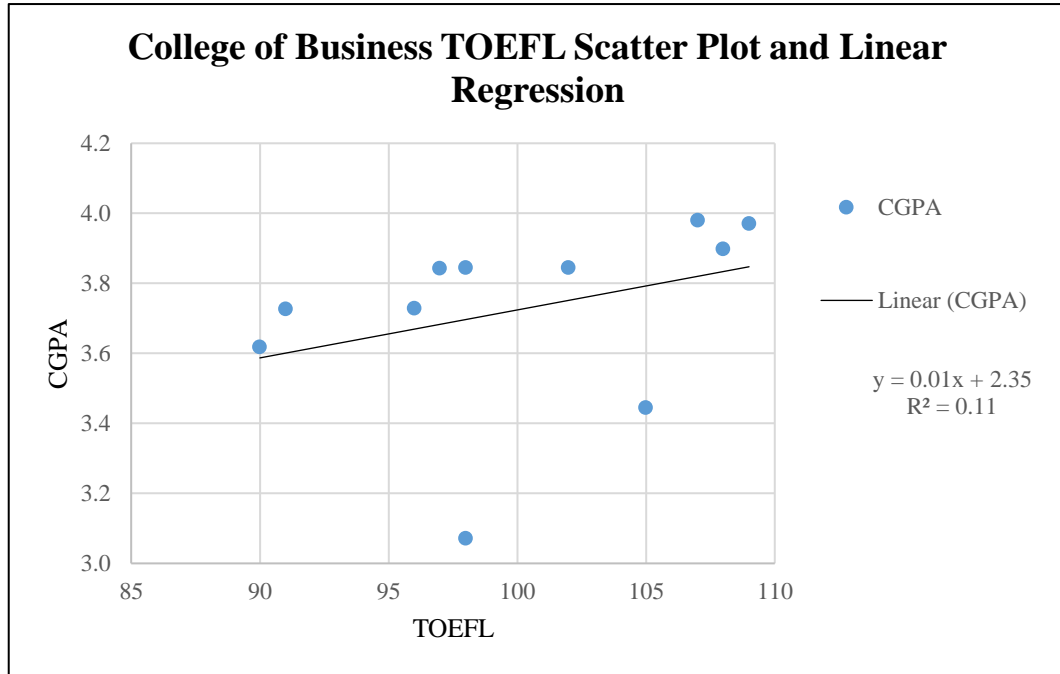


Figure 11: College of Business TOEFL Scatter Plot and Linear Regression

Figure 11 represents the TOEFL scores and CGPAs of international students who graduated during the Spring 2012 and Fall 2016 semesters from the College of Business. The normality test was met, the test for homoscedasticity was not met, and the test for linearity was not met. As a result, the TOEFL scores cannot be used to predict the CGPAs for international students within the College of Business.

#### College of Education and Human Performance TOEFL Scores and CGPAs

The following sample consisted of data points representing the TOEFL scores and CGPAs for 13 international students who graduated from the College of Education and Human Performance between the Spring 2012 and Fall 2016 academic semesters.

Table 19: Descriptive Statistics of TOEFL Scores and CGPAs for the College of Education and Human Performance

TOEFL Score		CGPA	
Mean	94.08	Mean	3.87
Standard Error	3.51	Standard Error	0.04
Median	98	Median	3.93
Mode	#N/A	Mode	4
Standard Deviation	12.66	Standard Deviation	0.131
Sample Variance	160.24	Sample Variance	0.02
Kurtosis	-1.72	Kurtosis	-1.24
Skewness	-0.19	Skewness	-0.69
Range	36	Range	0.35
Minimum	74	Minimum	3.65
Maximum	110	Maximum	4
Sum	1223	Sum	50.32
Count	13	Count	13

#### *Assumption Checks*

**Normality:** For the TOEFL scores, the skewness of the statistic of the residuals was -0.19 and kurtosis was -1.72. For the CGPAs, the skewness of the statistic of the residuals was -0.69 and kurtosis was -1.24. Both skewness and kurtosis were within the range considered normal (an approximate absolute value of 2.0 for skew and 7.0 for kurtosis), suggesting some evidence of normality.

### Linearity:

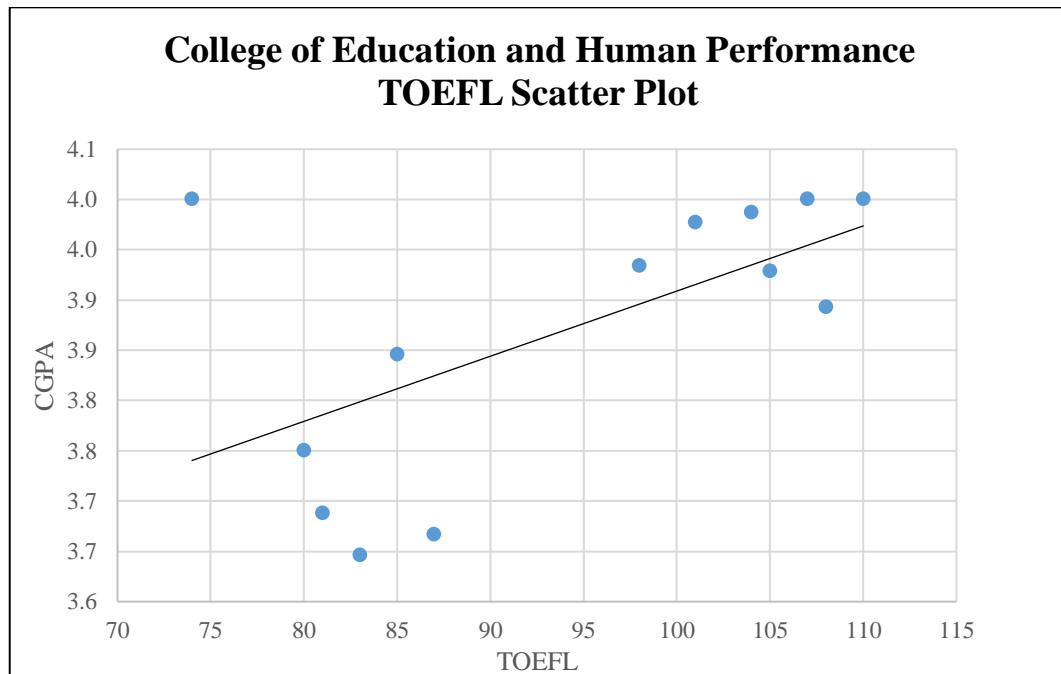


Figure 12: College of Education and Human Performance TOEFL Scatter Plot

Figure 12 represents the TOEFL scores and CGPAs of international students who graduated between Spring 2012 and Fall 2016 in the College of Education and Human Performance. A scatterplot of TOEFL scores and CGPAs was created. Visual inspection of this scatterplot indicated that there was no linear relationship between the variables.

**Homoscedasticity:** The data were heteroscedastic rather than homoscedastic, as assessed by visual inspection of a plot of standardized residuals versus standardized predicted values. However, no transformations were applied during the analysis, so the results may not be accurate. Since the assumptions of linear regression were not met, a linear regression model could not be used to predict students' CGPAs based on their TOEFL scores for international students within the College of Education and Human Performance.



### *Data Analysis Results*

Table 20: TOEFL Scores and CGPA College of Education and Human Performance Regression Statistics

Regression Statistics	
Multiple R	0.60
R Square	0.36
Adjusted R Square	0.30
Standard Error	0.11
P-value	0.03
Observations	13

Table 21: TOEFL Scores and CGPA of College of Education and Human Performance ANOVA

	df	SS	MS	F	<i>p</i>
Regression	1	0.08	0.08	6.23	0.03
Residual	11	0.14	0.01		
Total	12	0.22			

Table 22: TOEFL Scores and CGPA of College of Education and Human Performance Confidence Level

	$\beta$	<i>SE</i>	<i>t</i>	<i>p</i>	<i>Lower 95% CI</i>	<i>Upper 95% CI</i>
Intercept	3.26	0.25	13.24	0.00	2.72	3.80
TOEFL	0.01	0.00	2.50	0.03	0.00	0.01

A linear regression analysis revealed that TOEFL scores could not predict CGPAs with statistical significance with  $F(1, 11) = 6.23$ ,  $p = 0.03$  (See Table 21) and the TOEFL scores accounted for 0.36% of the explained variability in the CGPA. The regression equation indicated the predicted CGPA score =  $3.26 + 0.01 \times \text{TOEFL}$ . At the 95% level of confidence for the TOEFL scores, the confidence interval for the slope was (0.00, 0.01). (See Table 22)

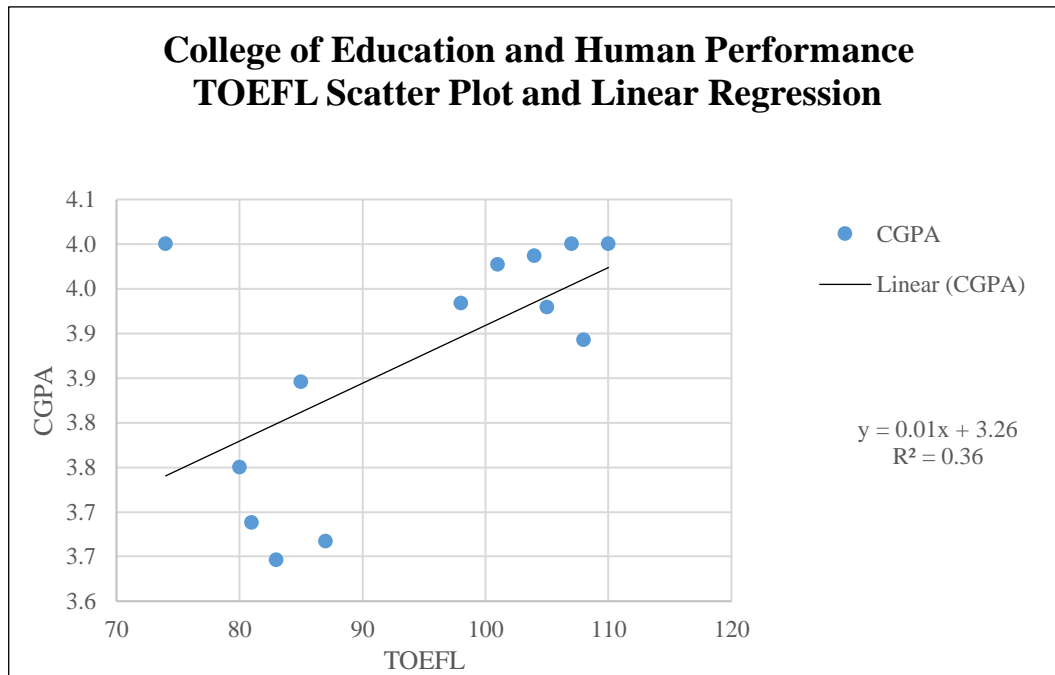


Figure 23: College of Education and Human Performance TOEFL Scatter Plot and Linear Regression

Figure 23 represents the TOEFL scores and CGPAs of international students who graduated during the Spring 2012 and Fall 2016 semesters from the College of Education and Human Performance. The test for normality was met, the test for homoscedasticity was not met, and the test for linearity was not met. As a result, the TOEFL scores cannot be used to predict the CGPAs for international students within the College of Education and Human Performance.

#### College of Engineering and Computer Science TOEFL Scores and CGPAs

The following sample consisted of data points representing the TOEFL scores and CGPAs of 261 international students who graduated from the College of Engineering and Computer Science between the Spring 2012 and Fall 2016 academic semesters.

Table 24: Descriptive Statistics of TOEFL Scores and CGPAs for the College of Engineering and Computer Science

TOEFL Score		CGPA	
Mean	92.78	Mean	3.64
Standard Error	0.65	Standard Error	0.017
Median	92	Median	3.68
Mode	90	Mode	4
Standard Deviation	10.51	Standard Deviation	0.27
Sample Variance	110.50	Sample Variance	0.07
Kurtosis	-0.34	Kurtosis	-0.23
Skewness	-0.02	Skewness	-0.64
Range	49	Range	1.19
Minimum	68	Minimum	2.81
Maximum	117	Maximum	4
Sum	24216	Sum	948.84
Count	261	Count	261

#### *Assumption Checks*

**Normality:** For the TOEFL scores, the skewness of the statistic of the residuals was -0.02 and kurtosis was -0.34. For the CGPA, the skewness of the statistic of the residuals was -0.64 and kurtosis was -0.23. Both skewness and kurtosis were within the range considered normal (an approximate absolute value of 2.0 for skew and 7.0 for kurtosis), suggesting some evidence of normality.

### Linearity:

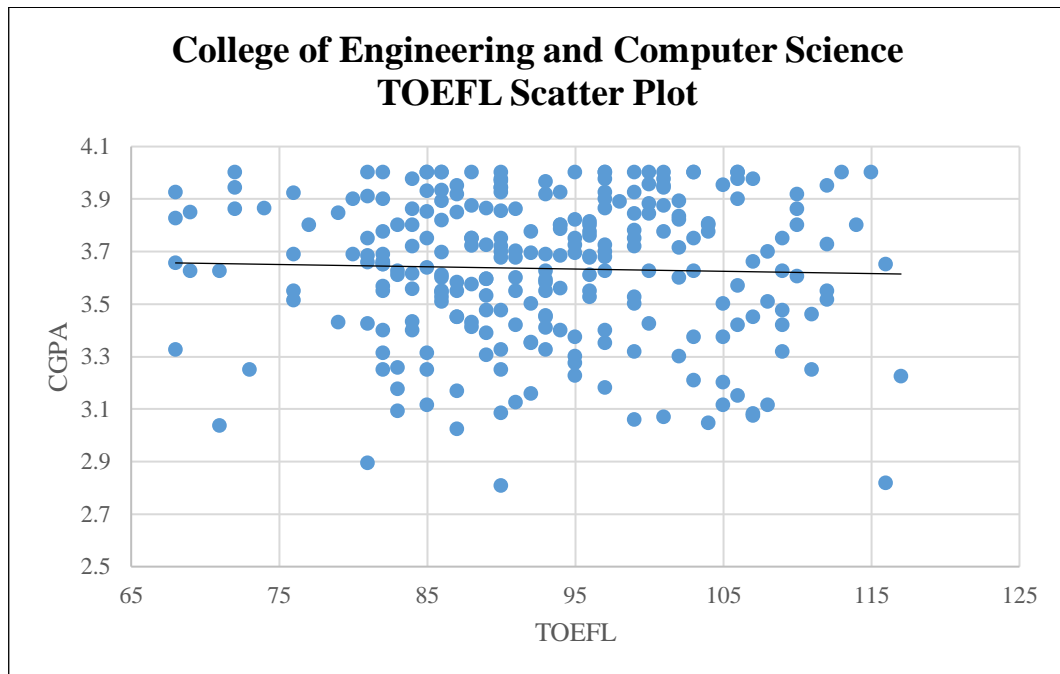


Figure 13: College of Engineering and Computer Science TOEFL Scatter Plot

Figure 13 represents the TOEFL scores and CGPAs of international students who graduated between Spring 2012 and Fall 2016 in the College of Engineering and Computer Science. A scatterplot of TOEFL scores and CGPAs was created. Visual inspection of this scatterplot indicated that there was no linear relationship between the variables.

**Homoscedasticity:** The data were heteroscedastic rather than homoscedastic, as assessed by visual inspection of a plot of standardized residuals versus standardized predicted values. However, no transformations were applied during the analysis, so the results may not be accurate. Since the assumptions of linear regression were not met, a linear regression model could not be used to predict students' CGPAs based on their TOEFL scores within the College of Engineering and Computer Science.

### Data Analysis Results

Table 25 : TOEFL Scores and CGPA College of Engineering and Computer Science  
Regression Statistics

Regression Statistics	
Multiple R	0.03
R Square	0.01
Adjusted R Square	-0.01
Standard Error	0.27
P-value	0.59
Observations	261

Table 26: TOEFL Scores and CGPA of College of Engineering and Computer Science  
ANOVA

	df	SS	MS	F	<i>p</i>
Regression	1	0.02	0.02	0.29	0.59
Residual	259	19.29	0.07		
Total	260	19.31			

Table 27: TOEFL Scores and CGPA of College of Engineering and Computer Science  
Confidence Level

	$\beta$	<i>SE</i>	<i>t</i>	<i>p</i>	<i>Lower 95% CI</i>	<i>Upper 95% CI</i>
Intercept	3.72	0.15	24.71	0.00	3.42	4.01
TOEFL	>0.01	>0.01	-0.54	0.59	-0.00	0.00

A linear regression analysis revealed that TOEFL scores could not predict CGPAs with statistical significance with  $F(1, 259) = 0.29$ ,  $p = 0.59$  (See Table 26) and the TOEFL scores accounted for less than 0.01% of the explained variability in the CGPA. The regression equation indicated the predicted CGPA score =  $3.72 + 0.01 \times \text{TOEFL}$ . At the 95% level of confidence for the TOEFL scores, the confidence interval for the slope was (0.00, 0.00). (See Table 27)

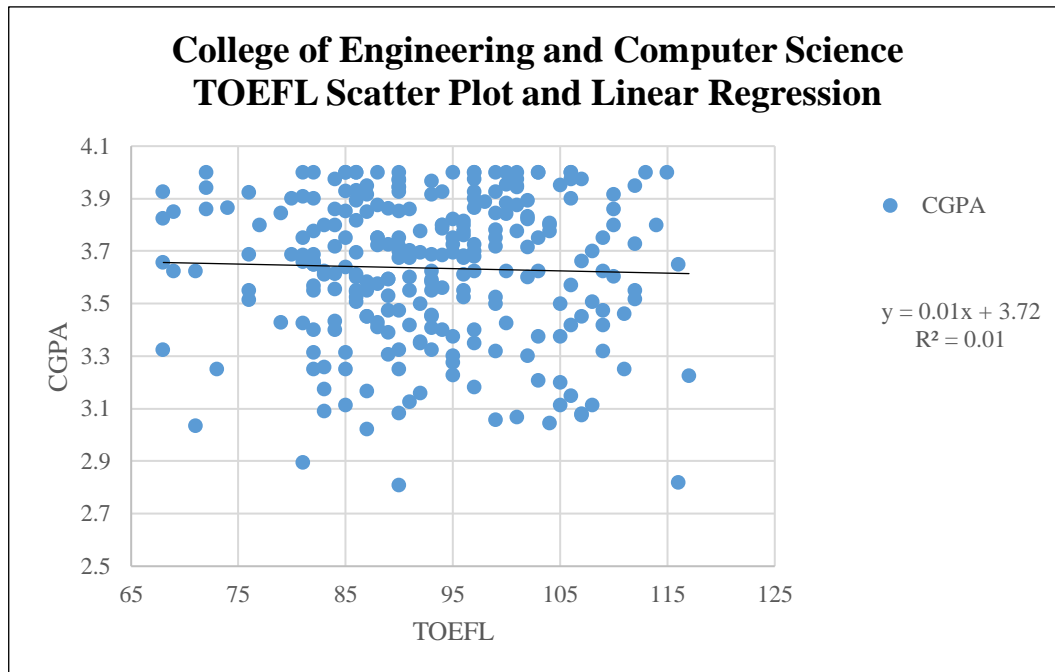


Figure 14: College of Engineering and Computer Science TOEFL Scatter Plot and Linear Regression

Figure 14 represents the TOEFL scores and CGPAs of international students who graduated during the Spring 2012 and Fall 2016 semesters from the College of Engineering and Computer Science. The test for normality was met, the test for homoscedasticity was not met, and the test for linearity was not met. As a result, the TOEFL scores cannot be used to predict the CGPAs for international students within the College of Engineering and Computer Science.

#### College of Health and Public Affairs TOEFL Scores and CGPAs

The following sample consisted of data points representing the TOEFL scores and CGPAs of seven international students who graduated from the College of Health and Public Affairs between the Spring 2012 and Fall 2016 academic semesters.

Table 28: Descriptive Statistics of TOEFL Scores and CGPAs for the College of Health and Public Affairs

TOEFL Score		CGPA	
Mean	89.71	Mean	3.86
Standard Error	4.54	Standard Error	0.04
Median	92	Median	3.92
Mode	#N/A	Mode	#N/A
Standard Deviation	12.01	Standard Deviation	0.11
Sample Variance	144.24	Sample Variance	0.01
Kurtosis	2.96	Kurtosis	-1.99
Skewness	-1.28	Skewness	-0.54
Range	39	Range	0.26
Minimum	66	Minimum	3.71
Maximum	105	Maximum	3.96
Sum	628	Sum	27.02
Count	7	Count	7

#### *Assumption Checks*

**Normality:** For the TOEFL scores, the skewness of the statistic of the residuals was -1.28 and kurtosis was 2.96. For the CGPAs, the skewness of the statistic of the residuals was -0.54 and kurtosis was -1.99. Both skewness and kurtosis were within the range considered normal (an approximate absolute value of 2.0 for skew and 7.0 for kurtosis), suggesting some evidence of normality.

### Linearity:

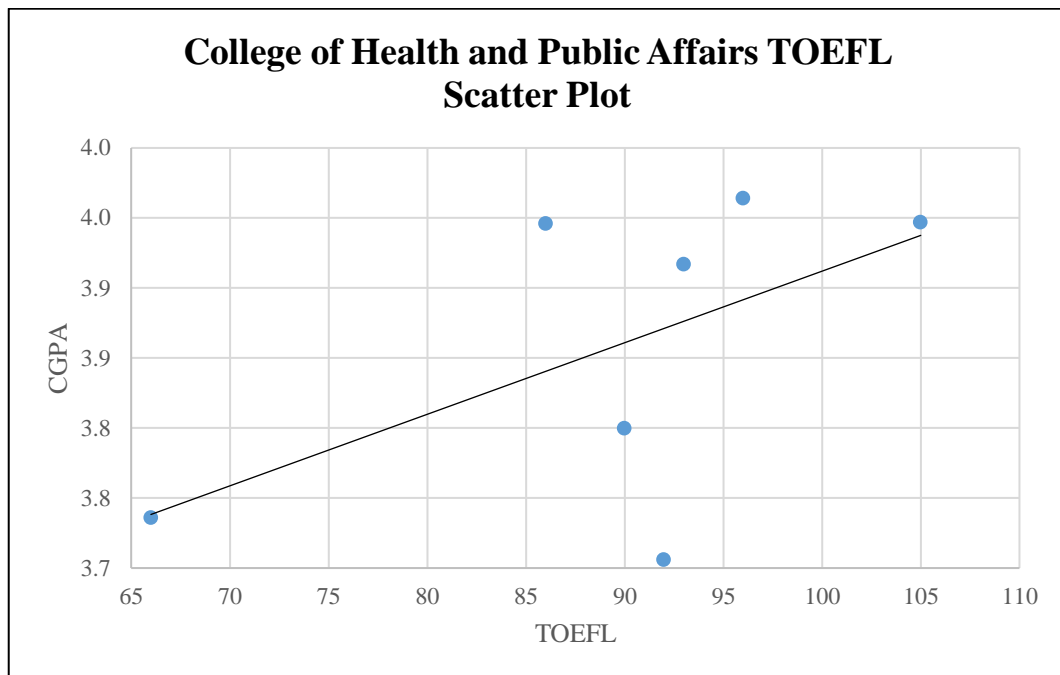


Figure 15: College of Health and Public Affairs TOEFL Scatter Plot

Figure 15 represents the TOEFL scores and CGPAs of international students who graduated between Spring 2012 and Fall 2016 in the College of Health and Public Affairs. A scatterplot of TOEFL scores and CGPAs was created. Visual inspection of this scatterplot indicated that there was no linear relationship between the variables.

**Homoscedasticity:** The data were heteroscedastic rather than homoscedastic, as assessed by visual inspection of a plot of standardized residuals versus standardized predicted values. However, no transformations were applied during the analysis, so the results may not be accurate. Since the assumptions of linear regression were not met, a linear regression model could not be used to predict students' CGPAs based on their TOEFL scores within the College of Health and Public Affairs.



### *Data Analysis Results*

Table 29: TOEFL Scores and CGPA College of Health and Public Affairs Regression Statistics

Regression Statistics	
Multiple R	0.56
R Square	0.32
Adjusted R Square	0.18
Standard Error	0.10
P-value	0.19
Observations	7

Table 30: TOEFL Scores and CGPA of Health and Public Affairs ANOVA

	df	SS	MS	F	<i>p</i>
Regression	1	0.02	0.02	2.30	0.19
Residual	5	0.05	0.01		
Total	6	0.07			

Table 31: TOEFL Scores and CGPA of College of Health and Public Affairs Confidence Level

	$\beta$	<i>SE</i>	<i>t</i>	<i>p</i>	<i>Lower 95% CI</i>	<i>Upper 95% CI</i>
Intercept	3.40	0.30	11.17	0.00	2.62	4.18
TOEFL	0.01	0.00	1.52	0.19	0.01	0.01

A linear regression analysis revealed that TOEFL scores could not predict CGPAs with statistical significance with  $F(1, 5) = 2.30$ ,  $p = 0.19$  (See Table 30) and the TOEFL scores accounted for 0.32% of the explained variability in the CGPA. The regression equation indicated the predicted CGPA score =  $3.40 + 0.01 \times \text{TOEFL}$ . At the 95% level of confidence for the TOEFL scores, the confidence interval for the slope was (0.01, 0.01). (See Table 31)

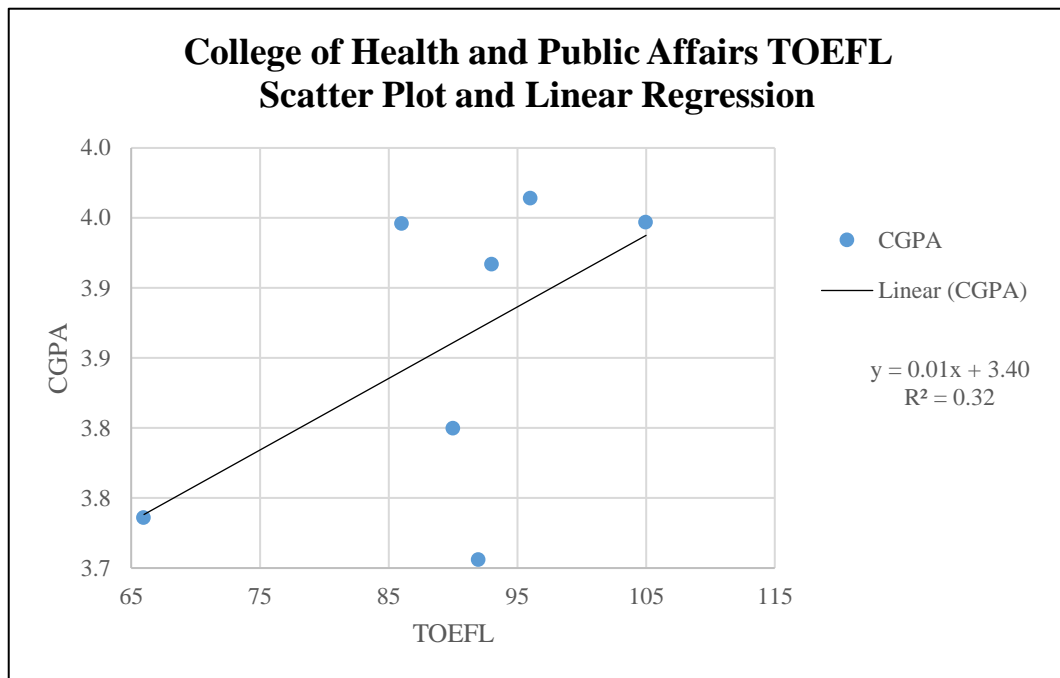


Figure 16: College of Health and Public Affairs TOEFL Scatter Plot and Linear Regression

Figure 16 represents the TOEFL scores and CGPAs of international students who graduated during the Spring 2012 and Fall 2016 semesters from the College of Health and Public Affairs. The test for normality was met, the test for homoscedasticity was not met, and the test for linearity was not met. As a result, the TOEFL scores cannot be used to predict the CGPAs for international students within the College of Health and Public Affairs.

### College of Optics and Photonics TOEFL Scores and CGPAs

The following sample consisted of data points representing the TOEFL scores and CGPAs of 18 international students who graduated from the College of Optics and Photonics between the Spring 2012 and Fall 2016 academic semesters.

Table 32: Descriptive Statistics of TOEFL Scores and CGPAs for the College of Optics and Photonics

TOEFL Score		CGPA	
Mean	96.67	Mean	3.63
Standard Error	2.42	Standard Error	0.07
Median	98.5	Median	3.63
Mode	108	Mode	3.44
Standard Deviation	10.25	Standard Deviation	0.29
Sample Variance	105.06	Sample Variance	0.08
Kurtosis	-1.25	Kurtosis	-1.48
Skewness	-0.28	Skewness	-0.12
Range	31	Range	0.81
Minimum	80	Minimum	3.19
Maximum	111	Maximum	4
Sum	1740	Sum	65.39
Count	18	Count	18

### *Assumption Checks*

**Normality:** For the TOEFL score, the skewness of the statistic of the residuals was -0.28 and kurtosis was -1.25. For the CGPAs, the skewness of the statistic of the residuals was -0.12 and kurtosis was -1.48. Both skewness and kurtosis were within the range considered normal (an approximate absolute value of 2.0 for skew and 7.0 for kurtosis), suggesting some evidence of normality.

### Linearity:

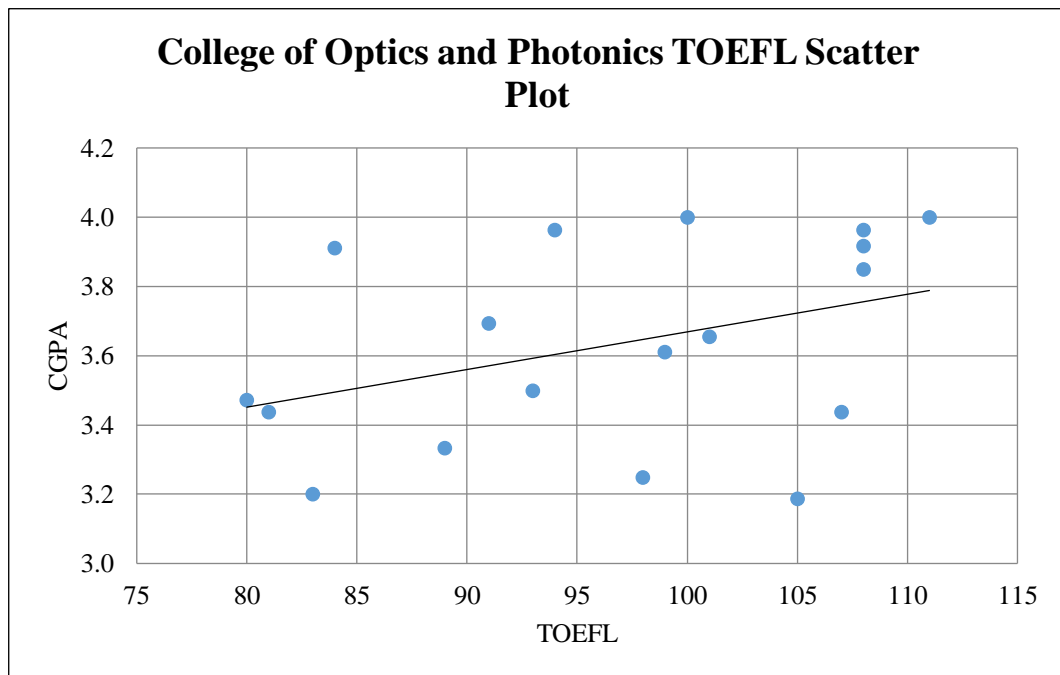


Figure 17: College of Optics and Photonics TOEFL Scatter Plot

Figure 17 represents the TOEFL scores and CGPAs of international students who graduated between Spring 2012 and Fall 2016 in the College of Optics and Photonics. A scatterplot of TOEFL scores and CGPAs was created. Visual inspection of this scatterplot indicated that there was no linear relationship between the variables.

**Homoscedasticity:** The data were heteroscedastic rather than homoscedastic, as assessed by visual inspection of a plot of standardized residuals versus standardized predicted values. However, no transformations were applied during the analysis, so the results may not be accurate. Since the assumptions of linear regression were not met, a linear regression model could not be used to predict students' CGPAs based on their TOEFL scores within the College of Optics and Photonics.

### *Data Analysis Results*

Table 33: TOEFL Scores and CGPA College Optics and Photonics Regression Statistics

Regression Statistics	
Multiple R	0.38
R Square	0.15
Adjusted R Square	0.09
Standard Error	0.28
P-value	0.12
Observations	18

Table 34: TOEFL Scores and CGPA of Optics and Photonics ANOVA

	df	SS	MS	F	<i>p</i>
Regression	1	0.21	0.21	2.74	0.12
Residual	16	1.23	0.08		
Total	17	1.44			

Table 35: TOEFL Scores and CGPA of College of Optics and Photonics Confidence Level

	$\beta$	<i>SE</i>	<i>t</i>	<i>p</i>	<i>Lower 95% CI</i>	<i>Upper 95% CI</i>
Intercept	2.58	0.64	4.05	0.00	1.23	3.93
TOEFL	0.01	0.01	1.66	0.12	0.00	0.02

A linear regression analysis revealed that TOEFL scores could not predict CGPAs with statistical significance with  $F(1, 16) = 2.74$ ,  $p = 0.12$  (See Table 34) and the TOEFL scores accounted for 0.15% of the explained variability in the CGPA. The regression equation indicated the predicted CGPA score =  $2.58 + 0.01 \times \text{TOEFL}$ . At the 95% level of confidence for the TOEFL scores, the confidence interval for the slope was (0.00, 0.02). (See Table 35)

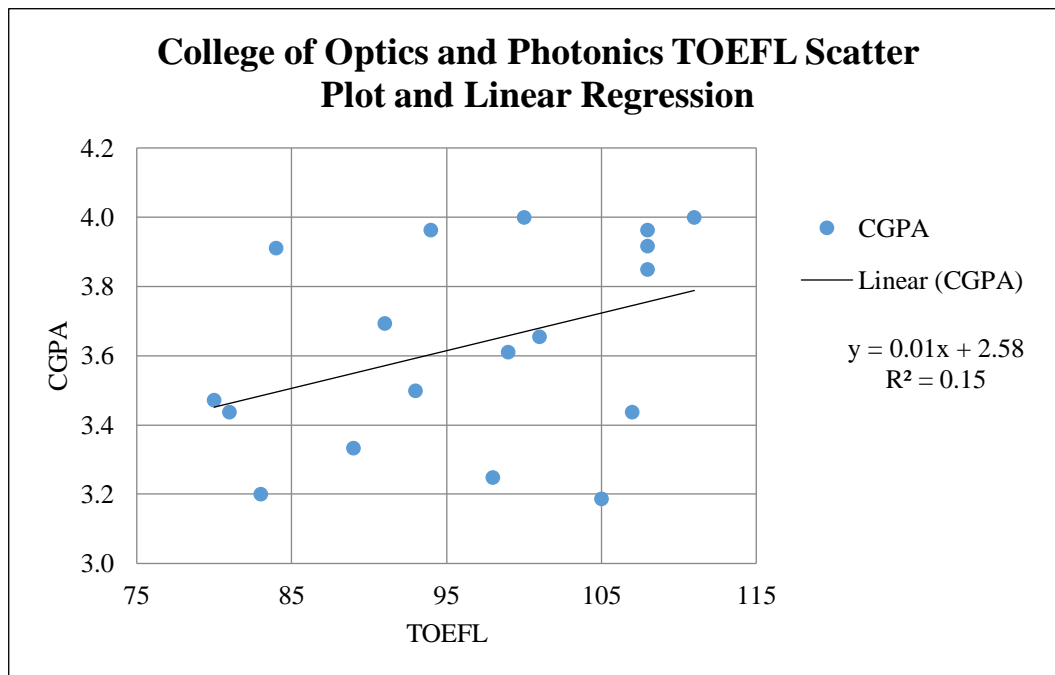


Figure 18: College of Optics and Photonics TOEFL Scatter Plot and Linear Regression

Figure 18 represents the TOEFL score and CGPAs of international students who graduated during the Spring 2012 and Fall 2016 semesters from the College of Optics and Photonics. The test for normality was met, the test for homoscedasticity was not met, and the test for linearity was not met. As a result, the TOEFL scores cannot be used to predict the CGPAs for international students within the College of Optics and Photonics.

#### College of Medicine TOEFL Scores and CGPAs

The following sample consisted of data points representing the TOEFL scores and CGPAs of six international students who graduated from the College of Medicine between the Spring 2012 and Fall 2016 academic semesters.

Table 36: Descriptive Statistics of TOEFL Scores and CGPAs for the College of Medicine

TOEFL Score		CGPA	
Mean	108.67	Mean	3.62
Standard Error	3.42	Standard Error	0.10
Median	111.5	Median	3.69
Mode	#N/A	Mode	#N/A
Standard Deviation	8.38	Standard Deviation	0.25
Sample Variance	70.27	Sample Variance	0.06
Kurtosis	1.07	Kurtosis	-1.63
Skewness	-1.29	Skewness	-0.65
Range	22	Range	0.59
Minimum	94	Minimum	3.26
Maximum	116	Maximum	3.85
Sum	652	Sum	21.71
Count	6	Count	6

#### *Assumption Checks*

**Normality:** For the TOEFL score, the skewness of the statistic of the residuals was -1.29 and kurtosis was 1.07. For the CGPAs, the skewness of the statistic of the residuals was -0.65 and kurtosis was -1.63. Both skewness and kurtosis were within the range considered normal (an approximate absolute value of 2.0 for skew and 7.0 for kurtosis), suggesting some evidence of normality.

### Linearity:

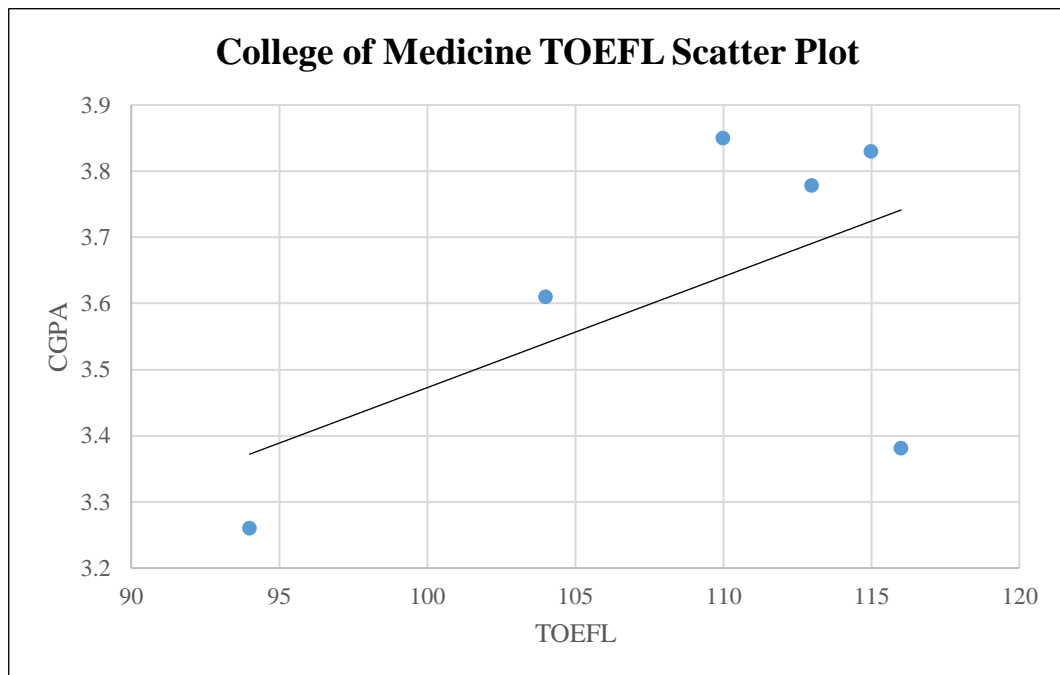


Figure 19: College of Medicine TOEFL Scatter Plot

Figure 19 represents the TOEFL scores and CGPAs of international students who graduated between Spring 2012 and Fall 2016 in the College of Medicine. A scatterplot of TOEFL scores and CGPAs was created. Visual inspection of this scatterplot indicated that there was no linear relationship between the variables.

**Homoscedasticity:** The data were heteroscedastic rather than homoscedastic, as assessed by visual inspection of a plot of standardized residuals versus standardized predicted values. However, no transformations were applied during the analysis, so the results may not be accurate. Since the assumptions of linear regression were not met, a linear regression model could not be used to predict students' CGPAs based on their TOEFL scores within the College of Medicine.



### *Data Analysis Results*

Table 37: TOEFL Scores and CGPA College of Medicine

Regression Statistics	
Multiple R	0.57
R Square	0.32
Adjusted R Square	0.15
Standard Error	0.23
P-value	0.24
Observations	6

Table 38: TOEFL Scores and CGPA of College of Medicine ANOVA

	df	SS	MS	F	<i>p</i>
Regression	1	0.10	0.10	1.89	0.24
Residual	4	0.21	0.05		
Total	5	0.31			

Table 39: TOEFL Scores and CGPA of College of Medicine Confidence Level

	$\beta$	<i>SE</i>	<i>t</i>	<i>p</i>	<i>Lower 95% CI</i>	<i>Upper 95% CI</i>
Intercept	1.79	1.33	1.35	0.25	-1.90	5.49
TOEFL	0.02	0.01	1.37	0.24	-0.02	0.05

A linear regression analysis revealed that TOEFL scores could not predict CGPAs with statistical significance with  $F(1, 4) = 1.89$ ,  $p = 0.24$  (See Table 38) and the TOEFL scores accounted for 0.32% of the explained variability in the CGPA. The regression equation indicated the predicted CGPA =  $1.79 + 0.02 \times \text{TOEFL}$ . At the 95% level of confidence for the TOEFL scores, the confidence interval for the slope was (-0.02, 0.05). (See Table 39)

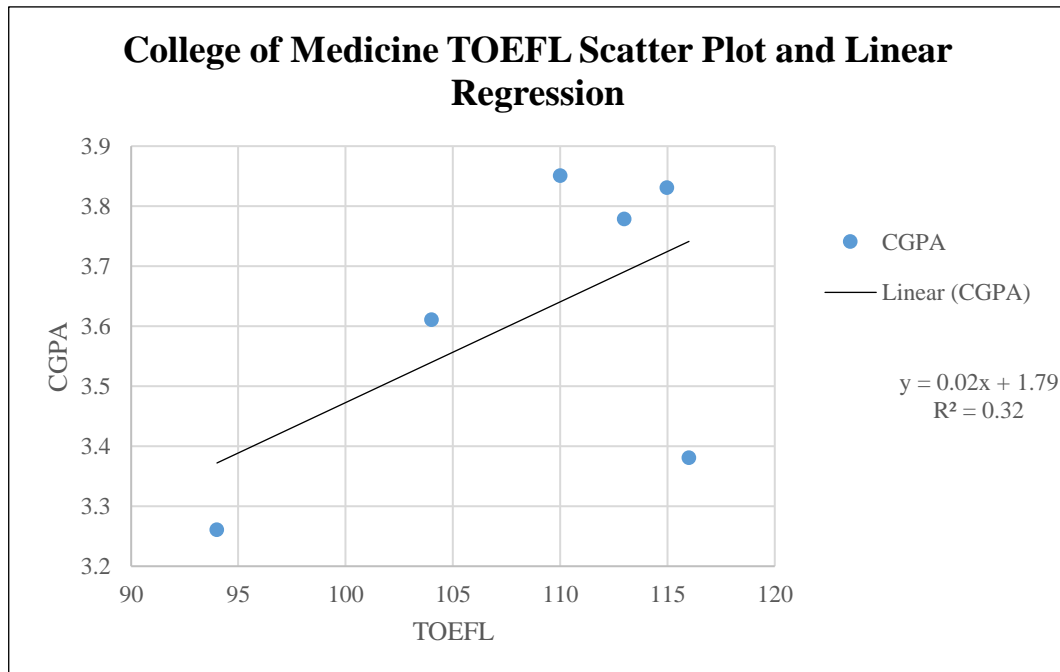


Figure 20: College of Medicine TOEFL Scatter Plot and Linear Regression

Figure 20 represents the TOEFL score and CGPAs of international students who graduated during the Spring 2012 and Fall 2016 semesters from the College of Medicine. The test for normality was met, the test for homoscedasticity was not met, and the test for linearity was not met. As a result, the TOEFL scores cannot be used to predict the CGPAs for international students within the College of Medicine.

#### College of Sciences TOEFL Scores and CGPAs

The following sample consisted of data points representing the TOEFL scores and CGPAs of 31 international students who graduated from the College of Sciences between the Spring 2012 and Fall 2016 academic semesters.

Table 40: Descriptive Statistics of TOEFL Scores and CGPAs for the College of Sciences

TOEFL Score		CGPA	
Mean	89.39	Mean	3.66
Standard Error	2.27	Standard Error	0.05
Median	90	Median	3.71
Mode	80	Mode	3.94
Standard Deviation	12.64	Standard Deviation	0.28
Sample Variance	159.85	Sample Variance	0.08
Kurtosis	0.00	Kurtosis	2.07
Skewness	0.44	Skewness	-1.23
Range	51	Range	1.25
Minimum	68	Minimum	2.75
Maximum	119	Maximum	4
Sum	2771	Sum	113.55
Count	31	Count	31

#### *Assumption Checks*

**Normality:** For the TOEFL score, the skewness of the statistic of the residuals was 0.44 and kurtosis was 0.00. For the CGPAs, the skewness of the statistic of the residuals was -1.23 and kurtosis was 2.07. Both skewness and kurtosis were within the range considered normal (an approximate absolute value of 2.0 for skew and 7.0 for kurtosis), suggesting some evidence of normality.

### Linearity:

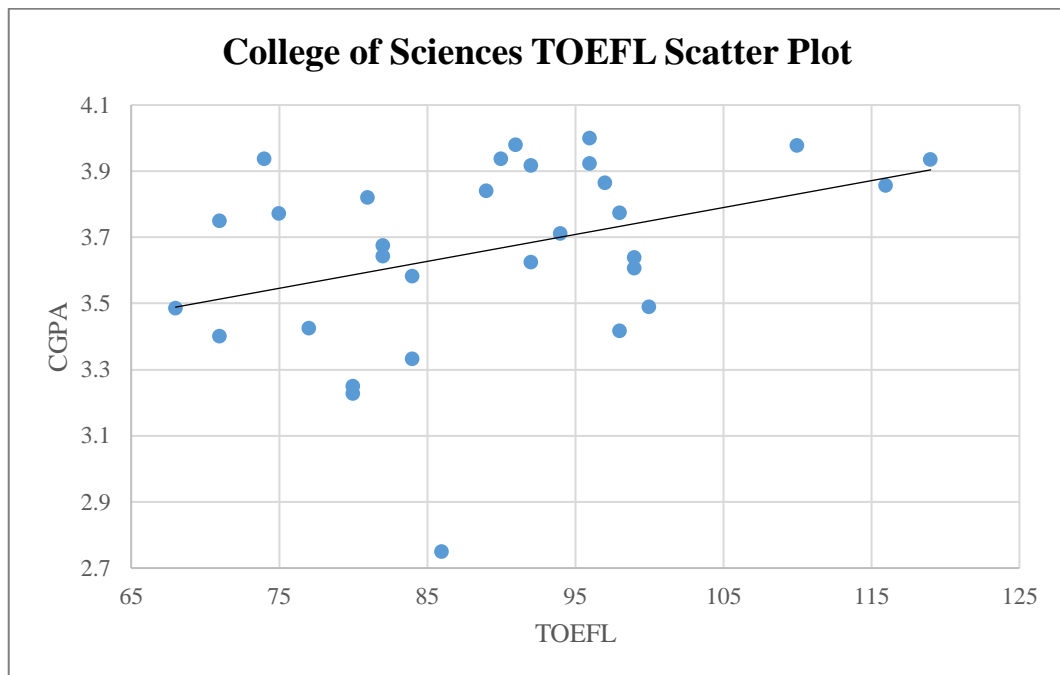


Figure 21: College of Sciences TOEFL Scatter Plot

Figure 21 represents the TOEFL scores and CGPAs of international students who graduated between Spring 2012 and Fall 2016 in the College of Sciences. A scatterplot of TOEFL scores and CGPAs was created. Visual inspection of this scatterplot indicated that there was no linear relationship between the variables.

**Homoscedasticity:** The data were heteroscedastic rather than homoscedastic, as assessed by visual inspection of a plot of standardized residuals versus standardized predicted values. However, no transformations were applied during the analysis, so the results may not be accurate. Since the assumptions of linear regression were not met, a linear regression model could not be used to predict students' CGPAs based on their TOEFL scores within the College of Sciences.

### *Data Analysis Results*

Table 41: TOEFL Scores and CGPA College Sciences Regression Statistics

Regression Statistics	
Multiple R	0.36
R Square	0.13
Adjusted R Square	0.10
Standard Error	0.27
P-value	0.04
Observations	31

Table 42: TOEFL Scores and CGPA of College of Sciences ANOVA

	df	SS	MS	F	<i>P</i>
Regression	1	0.32	0.32	4.42	0.04
Residual	29	2.08	0.07		
Total	30	2.40			

Table 43: TOEFL Scores and CGPA of College of Sciences Confidence Level

	$\beta$	<i>SE</i>	<i>t</i>	<i>p</i>	<i>Lower 95% CI</i>	<i>Upper 95% CI</i>
Intercept	2.94	0.35	8.40	0.00	2.22	3.65
TOEFL	0.01	0.00	2.10	0.04	0.00	0.02

A linear regression analysis revealed that TOEFL scores could not predict CGPAs with statistical significance with  $F(1, 29) = 4.42$ ,  $p = 0.04$  (See Table 42) and the TOEFL scores accounted for 0.13% of the explained variability in the CGPA. The regression equation indicated the predicted CGPA score =  $2.94 + 0.01 \times \text{TOEFL}$ . At the 95% level of confidence for the TOEFL scores, the confidence interval for the slope was (0.00, 0.02). (See Table 43)

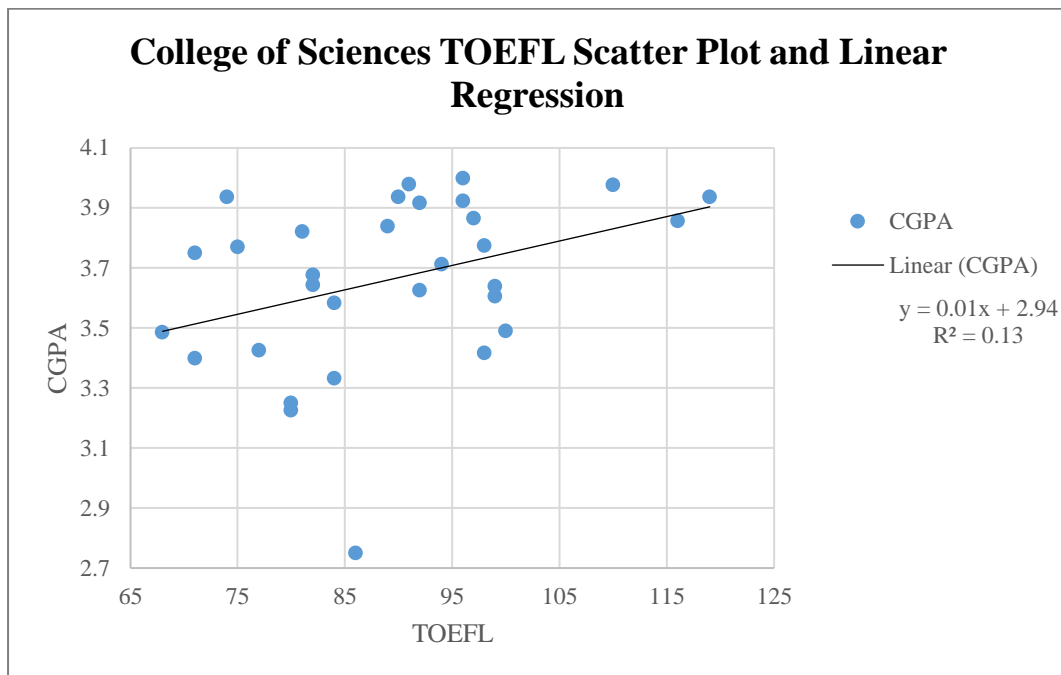


Figure 22: College of Sciences TOEFL Scatter Plot and Linear Regression

Figure 22 represents the TOEFL score and CGPAs of international students who graduated during the Spring 2012 and Fall 2016 semesters from the College of Sciences. The test for normality was met, the test for homoscedasticity was not met, and the test for linearity was not met. As a result, the TOEFL scores cannot be used to predict the CGPAs for international students within the College of Sciences.

#### Rosen College of Hospitality Management TOEFL Scores and CGPAs

The following sample consisted of data points representing the TOEFL scores and CGPAs of 23 international students who graduated from the Rosen College of Hospitality Management between the Spring 2012 and Fall 2016 academic semesters.

Table 44: Descriptive Statistics of TOEFL Scores and CGPAs for the Rosen College of Hospitality Management

TOEFL Score		CGPA	
Mean	91.04	Mean	3.69
Standard Error	1.54	Standard Error	0.06
Median	91	Median	3.79
Mode	84	Mode	3.75
Standard Deviation	7.41	Standard Deviation	0.28
Sample Variance	54.86	Sample Variance	0.08
Kurtosis	0.28	Kurtosis	-0.34
Skewness	-0.19	Skewness	-0.99
Range	31	Range	0.89
Minimum	74	Minimum	3.07
Maximum	105	Maximum	3.96
Sum	2094	Sum	84.77
Count	23	Count	23

#### *Assumption Checks*

**Normality:** For the TOEFL scores, the skewness of the statistic of the residuals was -0.19 and kurtosis was 0.28. For the CGPAs, the skewness of the statistic of the residuals was -0.99 and kurtosis was -0.34. Both skewness and kurtosis were within the range considered normal (an approximate absolute value of 2.0 for skew and 7.0 for kurtosis), suggesting some evidence of normality.

### Linearity:

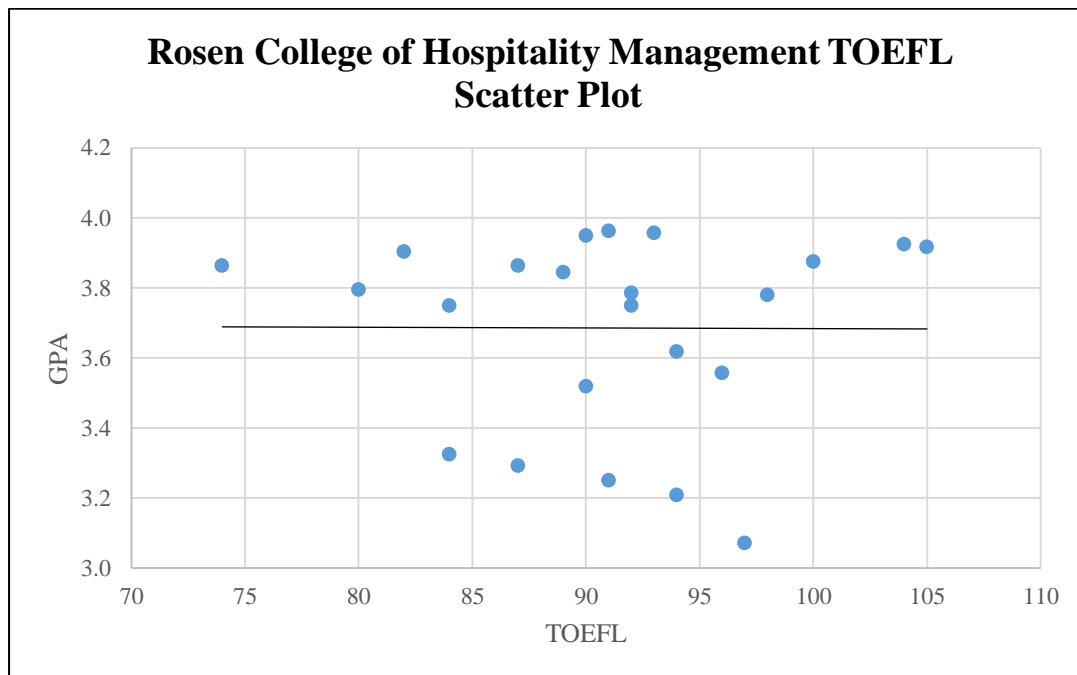


Figure 23: Rosen College of Hospitality Management TOEFL Scatter Plot

Figure 23 represents the TOEFL scores and CGPAs of international students who graduated between Spring 2012 and Fall 2016 in the Rosen College of Hospitality Management. A scatterplot of TOEFL scores and CGPAs was created. Visual inspection of this scatterplot indicated that there was no linear relationship between the variables.

**Homoscedasticity:** The data were heteroscedastic rather than homoscedastic, as assessed by visual inspection of a plot of standardized residuals versus standardized predicted values. However, no transformations were applied during the analysis, so the results may not be accurate. Since the assumptions of linear regression were not met, a linear regression model could not be used to predict students' CGPAs based on their TOEFL scores within the Rosen College of Hospitality Management.



### *Data Analysis Results*

Table 45: TOEFL Scores and CGPA Rosen College of Hospitality Management Regression Statistics

Regression Statistics	
Multiple R	0.01
R Square	0.01
Adjusted R Square	-0.05
Standard Error	0.28
P-value	0.98
Observations	23

Table 46: TOEFL Scores and CGPA of Rosen College of Hospitality Management ANOVA

	df	SS	MS	F	<i>p</i>
Regression	1	0.00	0.00	0.01	0.98
Residual	21	1.67	0.08		
Total	22	1.67			

Table 47: TOEFL Scores and CGPA of Rosen College of Hospitality Management Confidence Level

	$\beta$	<i>SE</i>	<i>t</i>	<i>P</i>	<i>Lower 95% CI</i>	<i>Upper 95% CI</i>
Intercept	3.70	0.74	4.99	0.00	2.16	5.25
TOEFL	0.01	0.01	-0.02	0.98	-0.02	0.02

A linear regression analysis revealed that TOEFL scores could not predict CGPAs with statistical significance with  $F(1, 21) = 0.01$ ,  $p = 0.98$  (See Table 46) and the TOEFL scores accounted for 0.01% of the explained variability in the CGPA. The regression equation indicated the predicted CGPA score =  $3.70 + 0.01 \times \text{TOEFL}$ . At the 95% level of confidence for the TOEFL scores, the confidence interval for the slope was  $(-0.02, 0.02)$ . (See Table 47)

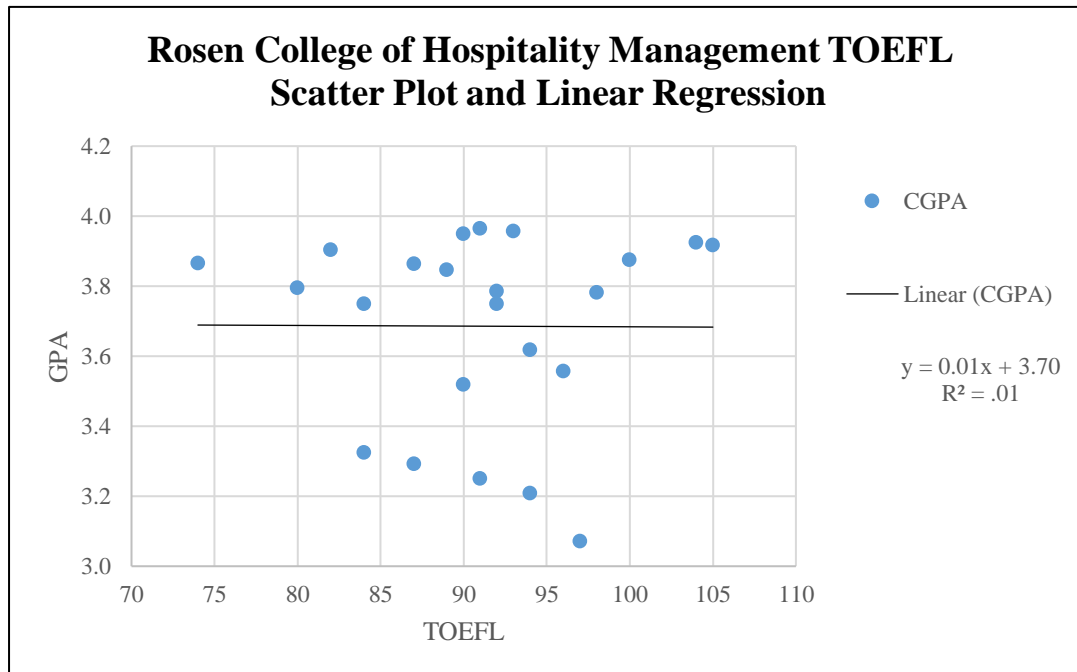


Figure 24: Rosen College of Hospitality Management TOEFL Scatter Plot and Linear Regression

Figure 24 represents the TOEFL scores and CGPAs of international students who graduated during the Spring 2012 and Fall 2016 semesters from the Rosen College of Hospitality Management. The test for normality was met, the test for homoscedasticity was not met, and the test for linearity was not met. As a result, the TOEFL scores cannot be used to predict the CGPAs for international students within the Rosen College of Hospitality Management.

### IELTS by College

There were seven colleges represented in the IELTS data, however, the College of Education and Human Performance and the College of Optics and Photonics had only one student each, the College of Arts and Humanities had three students, the College of Sciences and the Rosen College of Hospitality had four students each. Therefore, tables and graphs

were not included for those Colleges as their student samples were too small to provide a reliable calculation of the variables.

#### College of Engineering and Computer Science IELTS Scores and CGPAs

The following sample consisted of data points representing the IELTS scores and CGPAs of 38 international students who graduated from the College of Engineering and Computer Science between the Spring 2012 and Fall 2016 academic semesters.

Table 48: Descriptive Statistics of IELTS Scores and CGPAs for the College of Engineering and Computer Science

IELTS Score		CGPA	
Mean	6.79	Mean	3.57
Standard Error	0.09	Standard Error	0.05
Median	7	Median	3.5
Mode	7	Mode	4
Standard Deviation	0.58	Standard Deviation	0.28
Sample Variance	0.33	Sample Variance	0.08
Kurtosis	6.36	Kurtosis	-1.04
Skewness	-1.65	Skewness	0.02
Range	3.5	Range	0.96
Minimum	4.5	Minimum	3.04
Maximum	8	Maximum	4
Sum	258	Sum	135.51
Count	38	Count	38

### *Assumption Checks*

**Normality:** For the IELTS score, the skewness of the statistic of the residuals was -1.65 and kurtosis was 6.36. For CGPAs, the skewness of the statistic of the residuals was 0.02 and kurtosis was -1.04. Both skewness and kurtosis were within the range considered normal (an approximate absolute value of 2.0 for skew and 7.0 for kurtosis), suggesting some evidence of normality.

**Linearity:**

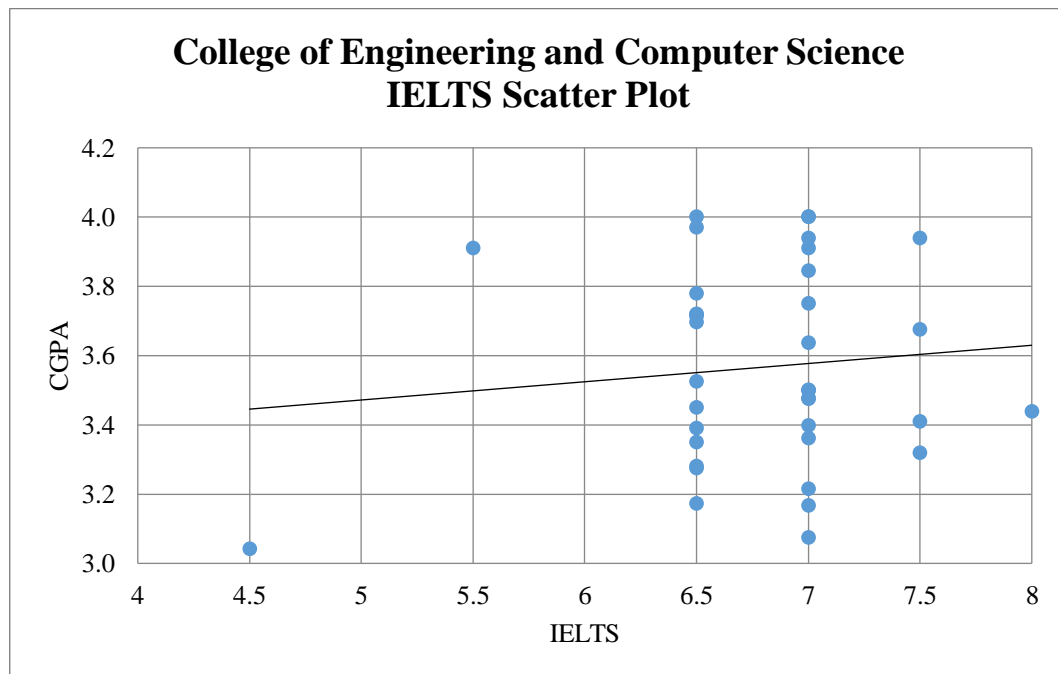


Figure 25: College of Engineering and Computer Science IELTS Scatter Plot

Figure 25 represents the IELTS scores and CGPAs of international students who graduated between Spring 2012 and Fall 2016 in the College of Engineering and Computer Science. A scatterplot of IELTS scores and CGPAs was created. Visual inspection of this scatterplot indicated that there was no linear relationship between the variables.

**Homoscedasticity:** The data were heteroscedastic rather than homoscedastic, as assessed by visual inspection of a plot of standardized residuals versus standardized predicted values.

However, no transformations were applied during the analysis, so the results may not be accurate. Since the assumptions of linear regression were not met, a linear regression model could not be used to predict students' CGPAs based on their IELTS scores within the College of Engineering and Computer Science.

### *Data Analysis Results*

Table 49: IELTS Scores and College of Engineering and Computer Science Regression Statistics

Regression Statistics	
Multiple R	0.11
R Square	0.01
Adjusted R Square	-0.02
Standard Error	0.28
P-value	0.52
Observations	38

Table 50: IELTS Scores and CGPA of College of Engineering and Computer Science ANOVA

	df	SS	MS	F	<i>p</i>
Regression	1	0.03	0.03	0.43	0.52
Residual	36	2.88	0.08		
Total	37	2.91			

Table 51: IELTS Scores and CGPA of College of Engineering and Computer Science Confidence Level

	$\beta$	<i>SE</i>	<i>t</i>	<i>p</i>	<i>Lower 95% CI</i>	<i>Upper 95% CI</i>
Intercept	3.21	0.55	5.84	0.00	2.09	4.32
IELTS	0.05	0.08	0.65	0.52	-0.11	0.22

A linear regression analysis revealed that IELTS scores could not predict CGPAs with statistical significance with  $F(1,36) = 0.43$ ,  $p = 0.52$  (See Table 50) and the IELTS scores

accounted for 0.01% of the explained variability in the CGPA. The regression equation indicated the predicted  $CGPA = 3.21 + 0.05 \times IELTS$ . At the 95% level of confidence for the IELTS scores, the confidence interval for the slope was (-0.11, 0.22). (See Table 51)

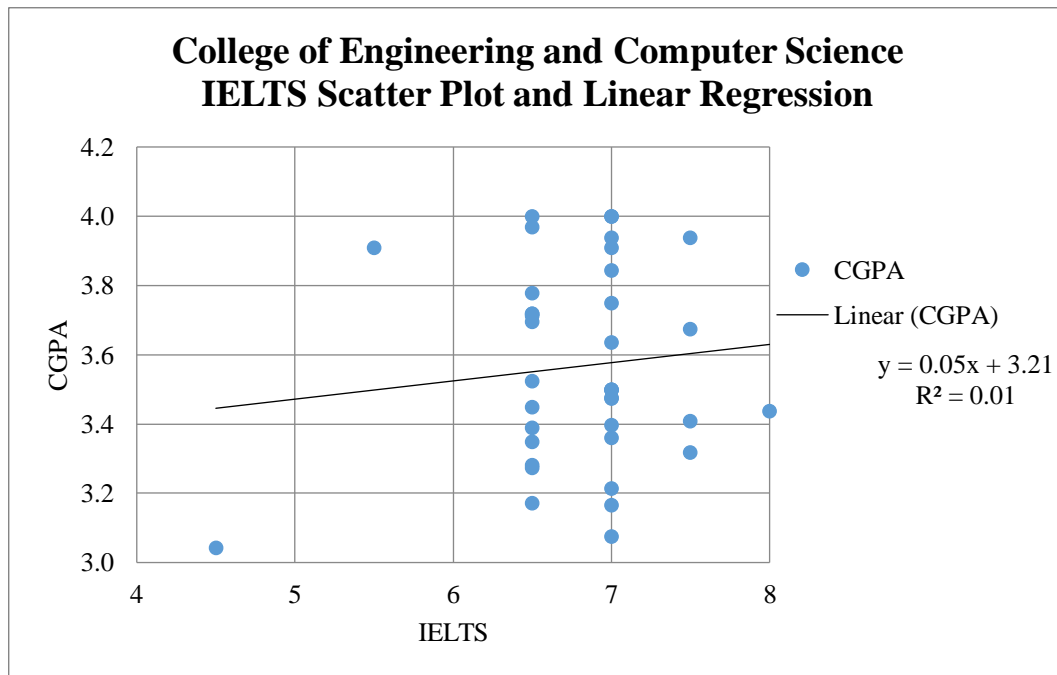


Figure 26: College of Engineering and Computer Science IELTS Scatter Plot and Linear Regression

Figure 26 represents the IELTS scores and CGPAs of international students who graduated during the Spring 2012 and Fall 2016 semesters from the College of Engineering and Computer Science. The data demonstrates a relatively flat linear regression line. Based on the data analysis, the IELTS scores cannot be used to predict the CGPAs for international students within the College of Engineering and Computer Science.

### College of Health and Public Affairs IELTS Scores and CGPAs

The following sample consisted of data points representing the IELTS scores and CGPAs of five international students who graduated from the College of Health and Public Affairs between the Spring 2012 and Fall 2016 academic semesters.

Table 52: Descriptive Statistics of IELTS Scores and CGPAs for the College of Health and Public Affairs

IELTS Score		CGPA	
Mean	6.7	Mean	3.80
Standard Error	0.12	Standard Error	0.05
Median	6.5	Median	3.79
Mode	6.5	Mode	#N/A
Standard Deviation	0.27	Standard Deviation	0.12
Sample Variance	0.08	Sample Variance	0.01
Kurtosis	-3.33	Kurtosis	-1.09
Skewness	0.61	Skewness	0.06
Range	0.5	Range	0.30
Minimum	6.5	Minimum	3.65
Maximum	7	Maximum	3.95
Sum	33.5	Sum	18.99
Count	5	Count	5

### *Assumption Checks*

**Normality:** For the IELTS scores, the skewness of the statistic of the residuals was 0.61 and kurtosis was -3.33. For the CGPAs, the skewness of the statistic of the residuals was 0.06 and kurtosis was -1.09. Both skewness and kurtosis were within the range considered normal (an approximate absolute value of 2.0 for skew and 7.0 for kurtosis), suggesting some evidence of normality.

### Linearity:

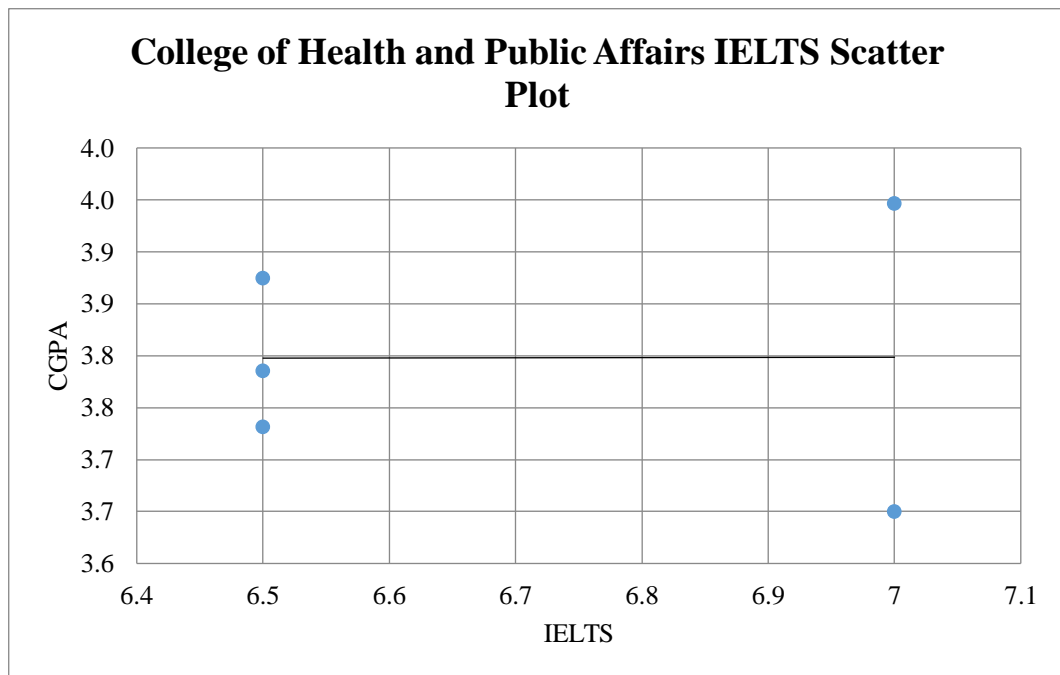


Figure 27: College of Health and Public Affairs IELTS Scatter Plot

Figure 27 represents the IELTS scores and CGPAs of international students who graduated between Spring 2012 and Fall 2016 in the College of Health and Public Affairs. A scatterplot of IELTS scores and CGPAs was created. Visual inspection of this scatterplot indicated that there was no linear relationship between the variables.

**Homoscedasticity:** The data were heteroscedastic rather than homoscedastic, as assessed by visual inspection of a plot of standardized residuals versus standardized predicted values. However, no transformations were applied during the analysis, so the results may not be accurate. Since the assumptions of linear regression were not met, a linear regression model could not be used to predict students' CGPAs based on their IELTS scores within the College of Health and Public Affairs.



### *Data Analysis Results*

Table 53: IELTS Scores and College of Health and Public Affairs Regression Statistics

Regression Statistics	
Multiple R	0.00
R Square	0.01
Adjusted R Square	-0.33
Standard Error	0.13
P-value	1.00
Observations	5

Table 54: IELTS Scores and CGPA of College of Health and Public Affairs ANOVA

	df	SS	MS	F	<i>p</i>
Regression	1	0.00	0.00	0.01	1.00
Residual	3	0.05	0.02		
Total	4	0.05			

Table 55: IELTS Scores and CGPA of College of Health and Public Affairs Confidence Level

	$\beta$	<i>SE</i>	<i>t</i>	<i>p</i>	<i>Lower 95% CI</i>	<i>Upper 95% CI</i>
Intercept	3.79	1.65	2.29	0.11	-1.47	9.04
IELTS	>0.01	0.25	0.01	1.00	-0.78	0.79

A linear regression analysis revealed that IELTS scores could not predict CGPAs with statistical significance with  $F(1, 3) = 2.30$ ,  $p = 0.01$  (See Table 54) and the IELTS scores accounted for less than 0.01% of the explained variability in the CGPA. The regression equation indicated the predicted CGPA score =  $3.79 + 0.01 \times \text{IELTS}$ . At the 95% level of confidence for the IELTS scores, the confidence interval for the slope was  $(-0.78, 0.79)$ . (See Table 55)

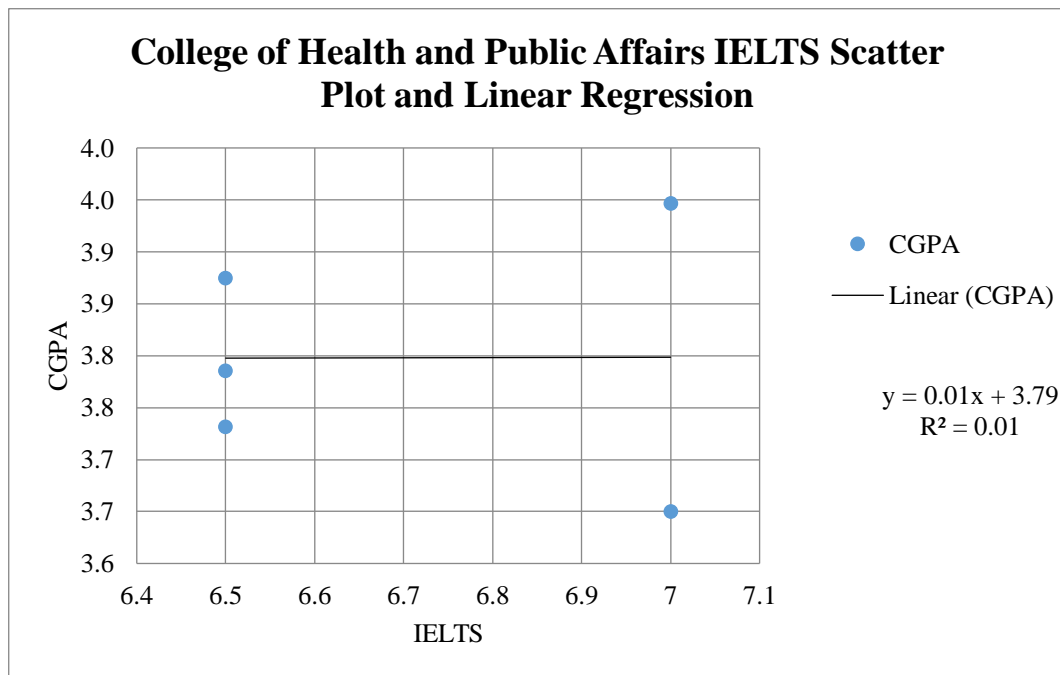


Figure 28: College of Health and Public Affairs IELTS Scatter Plot and Linear Regression

Figure 28 represents the IELTS scores and CGPAs of international students who graduated during the Spring 2012 and Fall 2016 semesters from the College of Health and Public Affairs. The test for normality was met, the test for homoscedasticity was not met, and the test for linearity was not met. As a result, the IELTS scores cannot be used to predict the CGPAs for international students within the College of Health and Public Affairs.

### Research Question Three

What is the difference of CGPA between students who took an English language test and those who had their English language requirement waived?

#### *Description of Participants for Research Question Three*

The retrieved data included a total of 400 UCF international graduate students who had their English language requirement waived in the study data during the Spring 2012 – Fall 2016 semesters. Of those, 115 graduated during the Spring 2012 – Fall 2016 academic semesters. In comparison, 468 international students who graduated during the Spring 2012 – Fall 2016 semesters were required to take an English language test. If an English language test requirement was waived, it is protocol for the graduate admissions staff to enter a reason as to why the score was waived for the student. However, the findings indicate that this protocol was not always adhered to, as the reasons were not always included in the notes section.

#### *Description of Analysis for Research Question Three*

To analyze this question, reasons why the English language requirement were waived were described. Next, assumption checks were described. The following section includes the results and analysis from the independent-samples t-test.

Table 56: English Waivers and CGPA

<b>Reasons Waived:</b>	<b>Total: 115</b>	<b>Average CGPA</b>
No reason provided	49	3.7
English was the sole medium of instruction at their university	30	3.6
Degree from an English speaking country	25	3.7
From a country whose official language is English	5	3.7
UCF employee attested to a student's proficiency in English	3	3.4
Expired TOEFL accepted	3	3.4
Non-degree student	1	3.7

### *Assumption Checks*

**Independence of Observations:** The independence of observations was not met as of the 115 students who had their English language test scores waived, 36 students also submitted a TOEFL or IELTS test score.

**Outliers Check:** The outliers of the group were determined by looking at data points that were more than or less than 1.5 times the interquartile range. There were no outliers in the waived group, but there were two outliers in the required group. However, since the data points were close to the quartiles, they were kept as part of the data analysis.

**Normality:** For the waived CGPAs, the skewness of the statistic of the residuals was -0.80 and kurtosis was 0.11. For the required CGPAs, the skewness of the statistic of the residuals was -0.67 and kurtosis was -0.30. Both skewness and kurtosis were within the range considered normal (an approximate absolute value of 2.0 for skew and 7.0 for kurtosis), suggesting some evidence of normality.

**Homogeneity of variance:** There was homogeneity of variances for CGPAs between the waived and required groups, as assessed by Levene's test for equality of variances ( $p = 0.19$ ).

## Results

The following table represents the Levene's Test for equality of variances and the t-test for equality of means.

Table 57: English Language Score Waivers CGPA versus Non-waived CGPA Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	<i>p</i>	<i>t</i>	<i>df</i>	<i>p</i> (2- tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
ScoreEqual variances assumed	1.70	0.19	.34	581	0.18	0.04	0.03	-0.02	0.10
Equal variances not assumed			1.40	182.27	0.16	0.04	0.03	-0.02	0.10

An independent-samples t-test was run to test if there were statistical significant differences in the CGPAs within the waived and required test score groups. The CGPA mean for the waived group was ( $M = 3.69$ ,  $SD = .26$ ). The CGPA for the required group was ( $M = 3.65$ ,  $SD = .27$ ). T-test results revealed that there was no statically significant difference,  $M = .04$ , 95% CI [-0.02, 0.09],  $t(581) = 1.35$ ,  $p = .178$ . Therefore, there was not a significant difference between the CGPAs of students who had their English test waived as compared to the students who were required to submit an English test score. Note that there were 15 CGPAs with a '0' listed for their CGPA. That indicates that they likely withdrew or were dismissed from the program, but were mistakenly not removed from the system. In order to better represent the affected population, the CGPAs and reasons waived for those 15 students were not included in the calculations.

## Survey Results

The fourth and fifth research questions explored international students' opinions about the English language tests and English language admission requirements. In order to answer these research questions, several questions from the Qualtrics survey were used (see appendix B). Table 58 presents the survey distribution, as well as the Qualtrics questions and results.

Table 58: Survey Results

Distribution	Audience Size	Surveys Started	Responses
Invite Over Email	1,269	279	235

### *Description of Participants who Completed the Survey Questions*

Participants in the survey were UCF international graduate students who were on an F or J visa and enrolled in three or more credit hours during the Fall 2018 semester.

### **Top Countries Where International Graduate Students Who Responded Received**

**Their Bachelor's Degree:** India: 23; China 22; United States: 20; Iran: 16; Bangladesh: 14; Italy: 11

**Overall GPA:** Average: 3.68; Median: 3.8; Mode: 4; Range: 3 – 4

**First/Home language:** Chinese: 21; Arabic: 16; Spanish: 15; English: 11; Persian 11; Bengali: 10

**Gender:** Male: 105; Female: 69; Prefer not to mention: 1

**Age:** Average: 28.6; Median: 28; Mode: 28

**Degree Seeking:** Doctoral: 131; Masters: 52; Certificate: 2; Master and Doctorate:1;

Specialist: 1

**Overall TOEFL:** Average: 109; Median: 96

**Overall IELTS:** Average: 6.98; Median: 7

#### Research Question Four

To what extent do international students feel prepared for study at UCF with regard to their English language abilities?

#### *Data Analysis for Research Question Four*

To answer question four, the results from two Likert-scale questions were examined using descriptive statistics.

**Survey Question 11a:** When I began study in this program at UCF, I was adequately prepared in my classes with regards to my English ability.

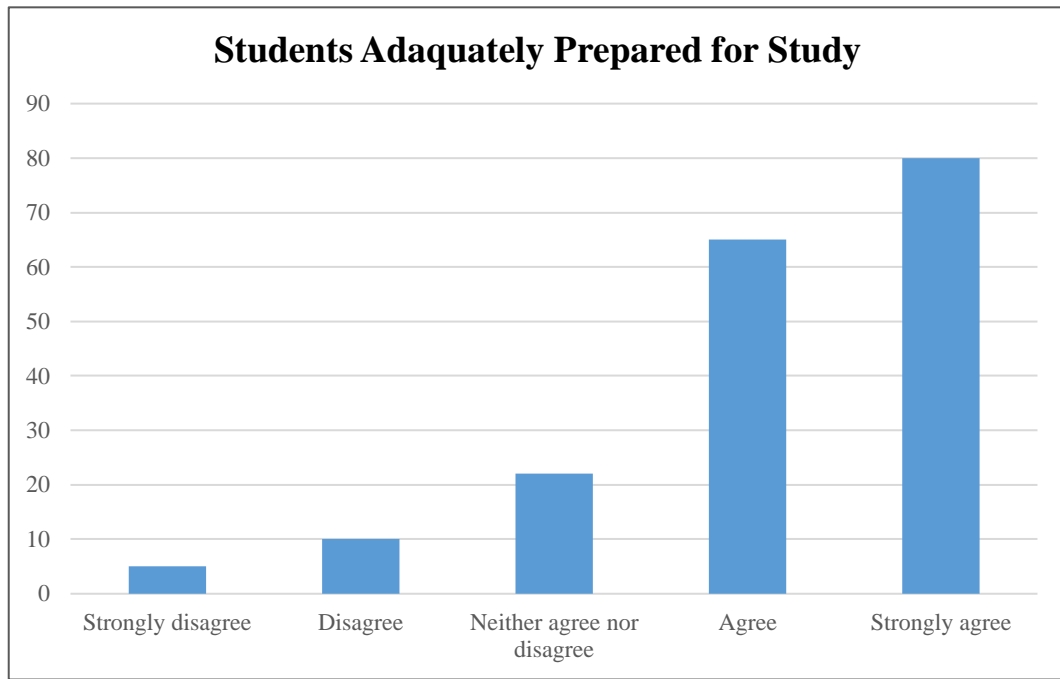


Figure 29: Students Adequately Prepared for Study

**Finding:** Of those students that responded, 80 students strongly agreed with that statement, 65 agreed, 22 neither agreed nor disagreed, 10 disagreed, and five strongly disagreed. Additionally, 145 students (80%) of the 182 respondents strongly agreed or agreed that they felt adequately prepared for classes with regard to their English ability.



**Survey Question 11b:** When I began study in this program at UCF, my ability to use English was adequate for living in the United States.

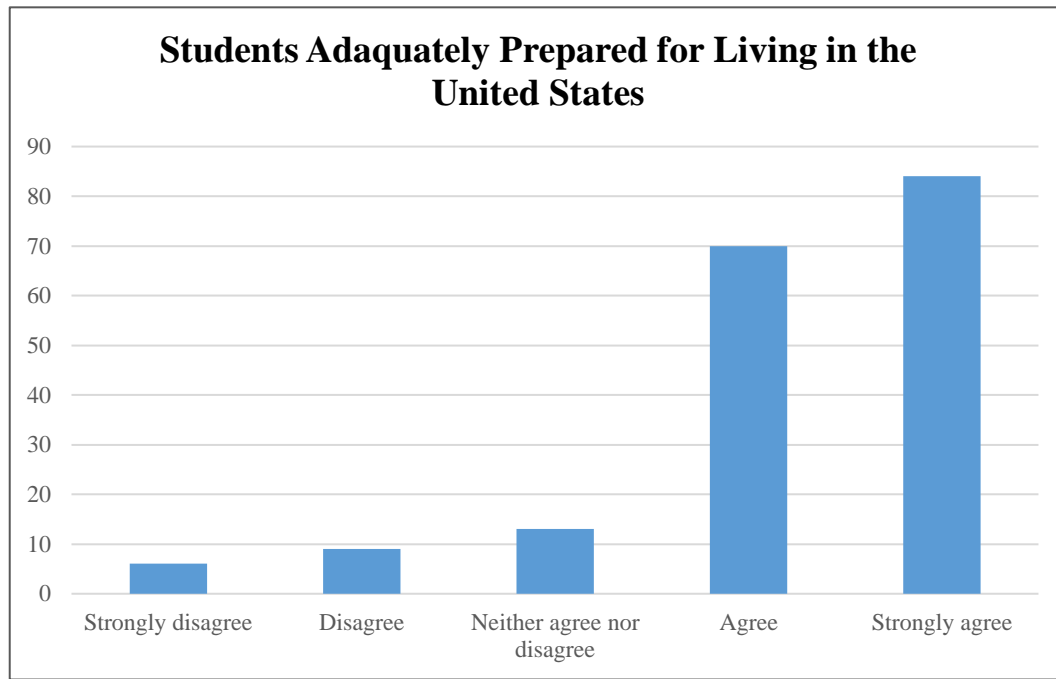


Figure 30: Students Adequately Prepared for Living in the United States

Finding: Of those students that responded, 84 students strongly agreed with that statement, 70 agreed, 13 neither agreed nor disagreed, nine disagreed, and six strongly disagreed. Additionally, 154 out of the 182 (85%) of the respondents strongly agreed or agreed that their English ability was adequate for living in the United States.

Overall, the results from the survey indicate that currently enrolled UCF international graduate students do feel prepared with regard to their English language ability as it relates to their ability to study and live in the United States.

### Research Question Five

What are international students' opinions regarding the TOEFL and IELTS tests?

#### *Data Analysis for Research Question Five*

To answer question five, two survey questions and three survey statements were examined using descriptive statistics. For the open-ended question, Braun and Clarke's (2006) six-phase framework was used.

**Survey Question nine:** Do you feel that the score was an accurate assessment of your English language abilities?

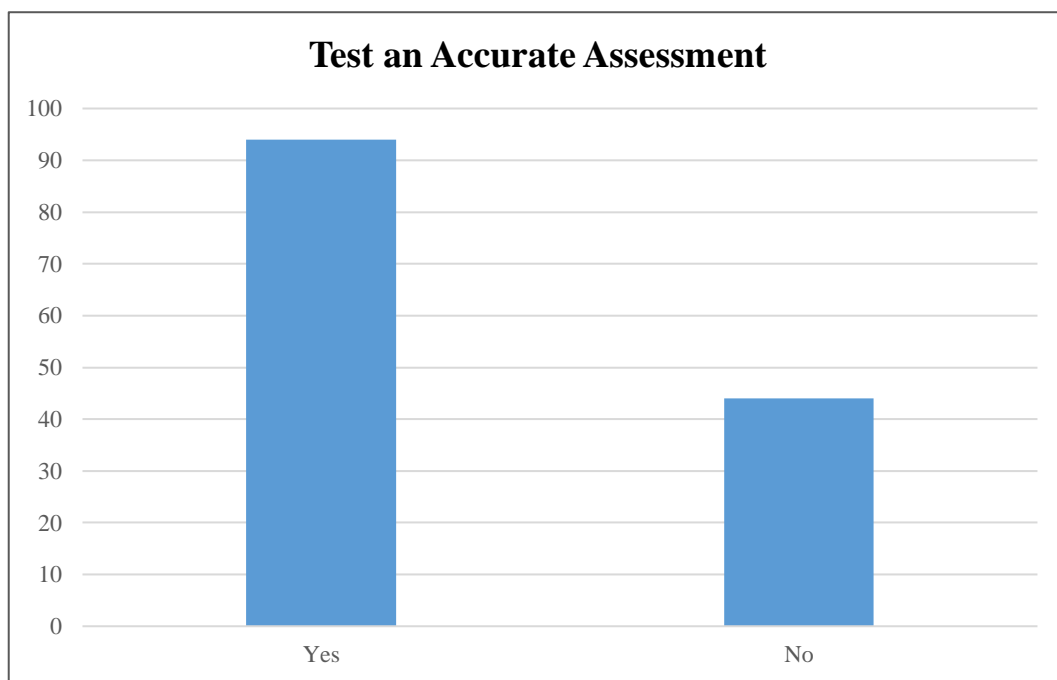


Figure 31: Test an Accurate Assessment

Findings: Students who indicated that they took either the TOEFL or IELTS test were asked this question. Of the 138 respondents, 94 (68%) felt like the test was an accurate assessment of their English Language abilities. However, there were 44 respondents (32%) who felt that the test was not an accurate assessment.

**Survey Statement 11e:** The English language score requirement of 80 for the TOEFL test is high enough for admission purposes.

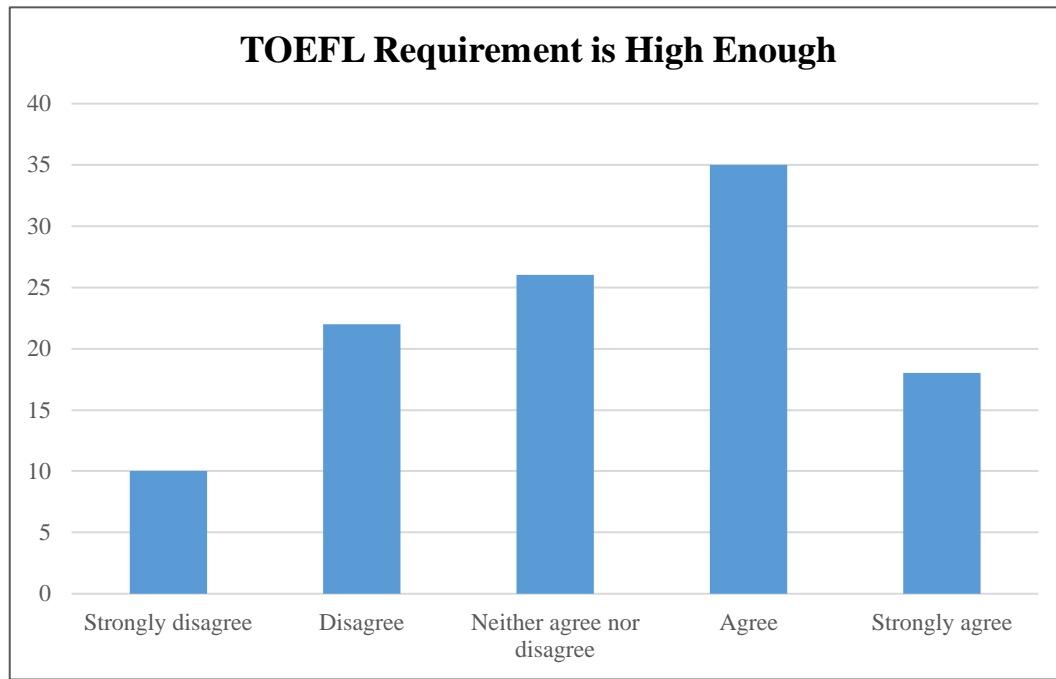


Figure 32: TOEFL Requirement High Enough

Finding: Of those who took the TOEFL test and responded to this question, 35 agreed, 26 neither agreed nor disagreed, 22 disagreed, 18 strongly agreed, and 10 strongly disagreed that the TOEFL requirement is high enough. Additionally, 53 out of 111 respondents (47%) agreed or strongly agreed that the TOEFL score requirement was high enough.

**Survey Statement 11f:** The English language score requirement of 6.5 for the IELTS test is high enough for admission purposes.

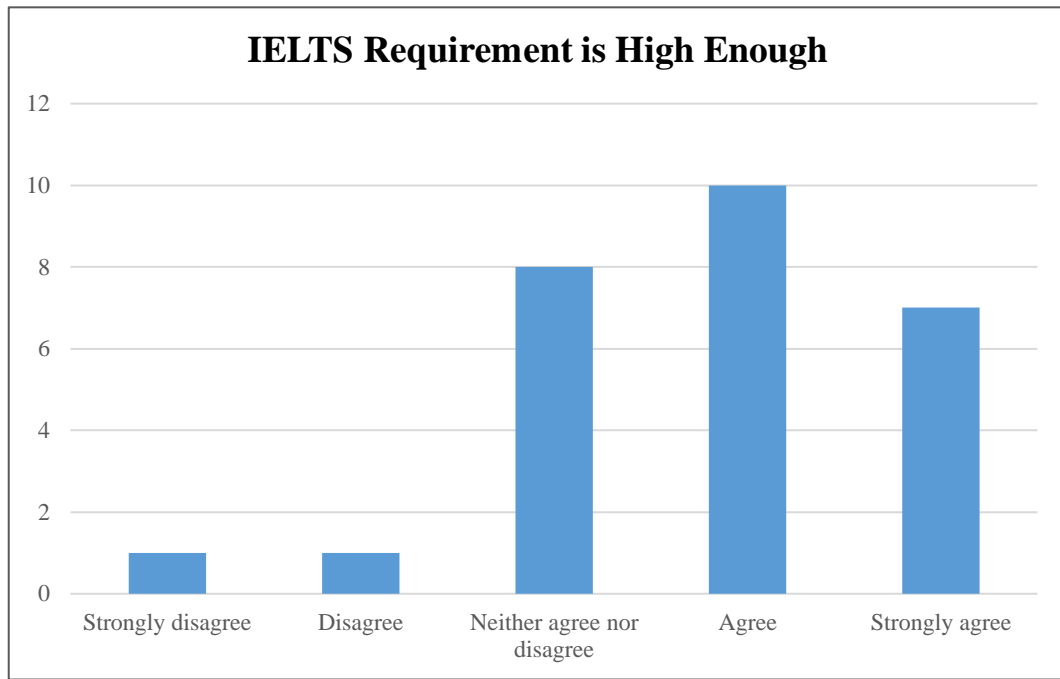


Figure 33: IELTS Requirement High Enough

Finding: Of those who took the IELTS test and responded, 10 agreed, eight neither agreed nor disagreed, seven strongly agreed, one disagreed, and one strongly disagreed that the IELTS requirement is high enough. Additionally, 17 out of 27 (62%) of respondents agreed or strongly agreed that the IELTS score was high enough.

**Survey Statement 11g:** The English language score requirements are too high for graduate admission purposes.

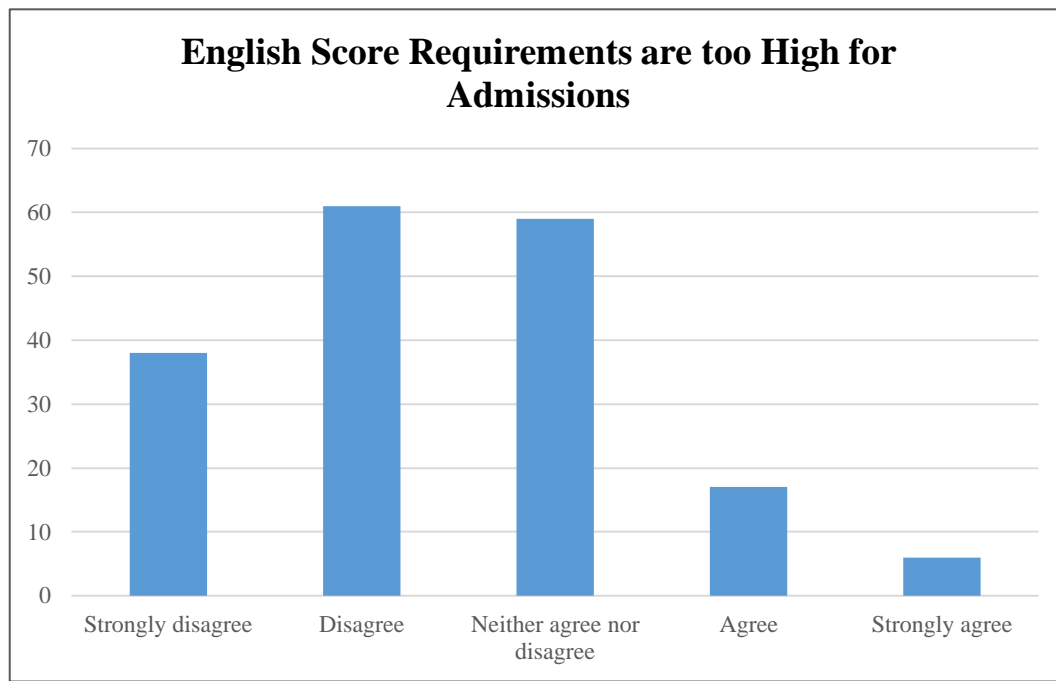


Figure 34: English Score Requirement too High

Finding: Of those that responded, 61 disagreed, 59 neither agreed nor disagreed, 38 strongly disagreed, 17 agreed, and six strongly agreed that the English score requirements are too high for graduate admission purposes. Additionally, 99 out of the 181 respondents (54%) disagreed or strongly disagreed that the English score requirements are too high for graduate admission purposes.

The last question of the survey was an open-ended question for students to include any other thoughts or opinions related to their English language test scores. To analyze this question, Braun and Clarke's (2006) six-phase framework was used. The six phases used to evaluate the question included: (a) becoming familiar with data, (b) generalizing initial codes, (c) searching for themes, (d) reviewing themes, (e) defining themes, and (f) writing-up

themes. Table 57 describes the themes derived from the open-ended question using the six-phase framework.

Table 59: Survey Comments

<b>Comment Type</b>	<b>Number of Comments</b>
Neutral	13
More English programs assistance desired	11
TOEFL and IELTS are not sufficient	8
Test scores are not high enough	3
Information about previous schooling	3
TOEFL and IELTS are not equivalent	2
Scores are not the problem	1
Scores are too high	1
Scores should be varied by program	1
Scores should not be required	1
Scores are needed	1
Professors are not American/hard to understand	1

Of the feedback received, two major topics emerged. One of the main concerns related to the desire for more English language assistance. One of the students responded describes:

I think international students need more help with the language. Although it is true that we can handle attending classes and participation in discussions more support is always welcome. I suggest organization of creative writing workshops, academic writing workshops, maybe create some tutoring in language for international students by language/country. I know there is resouces (sic.) available in the Writing Center but our articles are so long that 40 minutes per sessions (sic.) are not enough, specially if we are correcting essays. (female doctoral student)

Another student echoed the sentiment writing: “I think there should be more help for international graduate students who are pursuing a degree in humanities and social sciences.

Writing center is great but not enough” (male doctoral student). Some students expressed the opinion that the tests were not sufficient. One student, who did well on the TOEFL test, still did not feel prepared. They explained, “despite getting 113 at TOEFL, I don't feel adequate in listening and speaking-- I miss a lot of details when my classmates talk, or I stammer a lot because my mouth doesn't catch up with my mind” (female doctoral student). Another student explained:

Although I got a 7.5 in my IELTS test and my English level is quite good (but not enough to get a 7.5 in my opinion), I believe the IELTS exam is not an appropriate tool for examining a students' (sic.) English level. You can score high on a IELTS exam even if your English is not good, just by following some tips and strategies. I would therefore suggest using another way of evaluating students' language skills.  
(female master's student)

As mentioned by some previous researchers, one of the students suggested setting the requirement by major. They described in part:

The requirement for English should be varied according to courses. For example, students in the STEM program may not write as many papers as students pursuing education or other MA programs. Therefore, the requirement for English may not be as important as Mathematics or Science (female master's student).

The aforementioned comments highlight some of the students' concerns and thoughts regarding the English language test. The open-ended space provided a platform for students to be able to express concerns or thoughts that were not apparent throughout the survey.

## Summary

Overall, the research questions provided insights regarding the English language test scores' ability to predict CGPA and the international students' opinions regarding the English language tests. Research questions one and two indicated that English scores, by and large, did not have a statistical relationship to CGPAs. Research question three indicated that there was not a significant difference when comparing international students' CGPA of those who had their English language score requirement waived and those who were required to take the English language test. Results from the fourth research question suggest that international students, for the most part, feel that they were prepared with regard to their English language abilities as they related to their study and to their life in the United States. The fifth and final research question demonstrated that the international students felt that the English language test scores were appropriate for graduate admissions, but that more resources at UCF would be advantageous.



## **CHAPTER FIVE CONCLUSIONS AND RECOMMENDATIONS**

### **Introduction**

The purpose of this research was to test if the current minimum scores in the English language proficiency tests – Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS) – reflect a level of English language proficiency necessary to be academically successful at the University of Central Florida (UCF). Using collected data, TOEFL and IELTS scores were analyzed to determine if they had any statistically significant linear relationship to international graduate students' academic success as measured by the students' graduate cumulative grade point averages (CGPAs). Additionally, survey results were evaluated in order to better understand how current international graduate students perceive the TOEFL and IELTS. This chapter provides a discussion of the findings and potential implications of the five research questions that were discussed in chapter four. The relevance of this study and its contribution to appropriate educational literature and practices will also be discussed, followed by a discussion of the limitations and future research. The chapter concludes with a summation of the research.

The following research questions were explored:

1. Can the TOEFL or IELTS scores provide statistically significant predictions of international graduate students' academic success as defined by their cumulative grade point average (CGPA)?
2. Can the TOEFL and IELTS scores predict student CGPAs within different colleges?
3. What is the CGPA difference between students who took an English language test and those who had their English language requirement waived?

4. To what extent do international students feel prepared for study at UCF with regard to their English language abilities?
5. What are international students' opinions of the TOEFL and IELTS tests?

### Findings and Implications

Below is a discussion of findings and implications as explored through the five research questions:

#### Discussion of Results and Implications Addressing Question One

Can the TOEFL or IELTS scores provide statistically significant predictions of international graduate students' academic success as defined by their CGPA?

Since the assumptions of linear regression were not met, a linear regression model could not be used to predict CGPA based on IELTS or TOEFL scores. The data analysis and graphs demonstrated that there was almost no linear relationship or correlation between the CGPA and TOEFL score. Therefore, the TOEFL and IELTS scores did not significantly contribute to or predict CGPAs.

The findings demonstrate that an international graduate student who has a low English language test score will not inevitably have a low CGPA. Conversely, the findings demonstrate that an international graduate student with a high English language test score will not automatically have a high CGPA. While the English language test scores may still be used for admission decisions considerations, the test scores were not a good determinant of whether or not an international student would academically succeed in a graduate program at UCF.

The findings from question one are congruent with some of the conclusions that were previously discussed in the literature review. Researchers have found that the English language tests were not a good indicator of an international student's academic success (Arcuino, 2013; Storch and Lynch, 1999; Vu and Vu, 2013).

### Discussion of Results and Implications Addressing Question Two

Can the TOEFL and IELTS scores predict student CGPAs within different colleges?

As the assumptions of linear regression were not met for research question two, the data demonstrated that a linear regression model could not be used to predict CGPA based on TOEFL or IELTS scores for international students in the various colleges. The data analysis and graphs determined that there was not a significant difference in TOEFL and IELTS scores when separated by colleges. Overall, the data demonstrated relatively flat linear regression lines. Therefore, the TOEFL or IELTS scores did not significantly contribute to, or predict the changes of CGPA scores for the different colleges.

The findings from question two demonstrated that TOEFL or IELTS could not be used to predict if an international student would academically succeed at UCF based on the various colleges. Therefore, based on the data analyzed, there was no justification for colleges to have different English language score requirements.

As previously mentioned, Wait and Gressel (2009) found that certain programs would benefit from having higher or lower TOEFL requirements based on the level and rigor of English in the program. Correspondingly with IELTS, Bayliss and Ingram (2006) found that there were some programs that required a higher level of English level proficiency, and therefore a higher IELTS score was recommended. However, while a college may request a higher English language test score requirement, the findings from this research did not

support the need for different colleges to have a higher or lower English language test requirement based on the English rigor of the program.

### Discussion of Results and Implications Addressing Question Three

What is the CGPA difference between students who took an English language test and those who had their English language requirement waived?

As demonstrated in the third research question results, there was only a small difference in the final CGPAs between international students who had their English language requirement waived, and those that were required submit a test score. The average CGPA of those who had their English language score waived was a 3.69 and the average CGPA of those who were required to take the test was a 3.65. The high P-value indicated that the differences between having a test score and having the requirement waived were not significant. This finding suggests that the current basis for granting English language test waivers at UCF is consistent with the current minimum English language test scores required for admission.

The data does not indicate there should be any changes to the admissions requirement of English test waivers based on the findings of this research. This suggests that there was not sufficient contrary results from the data to modify or remove the basis for granting English waivers, at least as long as the current minimum English language test scores required for admission remain the same. Based on these research findings, an international student is not more or less likely to have a higher or lower CGPA based on whether or not they were required to submit an English language test score requirement, or if they had their English language test requirement waived. It should be noted that there has not been any previously

conducted academic research that explored English language requirement waivers as they relate to international graduate students' academic success.

#### Discussion of Results and Implications Addressing Question Four

To what extent do international students feel prepared for study at UCF with regard to their English language abilities?

Research results indicate that current international students did feel prepared with regards to their English language ability. With 80% of the international students who responded to the survey question indicating that they felt prepared with their academic study at UCF, and 85% of international students who responded to the survey question indicating that they felt prepared for living in the United States the conclusion is that they feel they are sufficiently prepared with regards to their English language ability.

These findings demonstrate that the international students do feel confident in their English language abilities. Based on this information, more help and support is not required for international students prior to their enrollment at UCF. Furthermore, it could be surmised that the English language admission requirements are adequate for international students to perceive that they have a high enough level of English language ability to study at UCF.

The findings from question four reflect the previously mentioned literature themes where Yeh and Inose (2003) found that English language fluency contributed to international students' acculturative stress. While this research did not specifically address an international student's stress, if an international graduate student at UCF feels confident in their English language abilities, then they will likely have less stress as it relates to study and life in the United States.

## Discussion of Results and Implications Addressing Question Five

What are international students' opinions of the TOEFL and IELTS tests?

The fifth research question explored the thoughts and opinions of international students regarding the English language tests. It was important to obtain the international graduate students' perspective and to look beyond the numbers and statistical analyses. Overall, international students felt that the test was an accurate assessment of their English language abilities, and that the minimum score requirements were sufficient. However, based on the open-ended survey question, a number of students felt that more English language resources at UCF would be beneficial. Thus, while they felt that the English test minimum score requirements were sufficient, they indicated that they could still benefit from additional English language assistance.

Although the international students indicated in research question four that they felt prepared, the current international students also suggested that more English language resources would be beneficial for international students once they are on campus. While the international students acknowledged the presence of the Writing Center at UCF, they still felt that more resources, such as English courses for international students and writing workshops, would be helpful. So even if an international graduate student does feel prepared with regards to their English language ability, it would be useful for UCF to provide more English language support for international students on campus.

The findings from this research question correspond with the aforementioned research where L. Vu and P. Vu (2013) found that international students thought that their English test language scores were reliable and a good indicator of their academic achievement. The results from that research are similar to the results of this study in that the respondents from both studies felt that the English language score requirements were sufficient. This study

underscores previously conducted research by reiterating the confidence of international students as it relates to English language test scores.

### Relevance of the Study

The results from this study are important because they provide a more robust understanding of the relationship between English language test scores and international graduate students' CGPA. As one of the goals of UCF is to increase graduate enrollment to 10,000 students by 2020 (University of Central Florida, 2017), it is important that the students admitted to UCF are able to succeed academically. As one of the requirements and admission decisions considerations is for international graduate students to submit an English language test score, the English language test score should be able to accurately reflect an international graduate student's English language capabilities.

This study confirmed previously conducted research that indicated there was not a significant relationship between English language test scores and an international student's academic success (Arcuino, 2013; Arrigoni and Clark, 2015; Hill, Storch and Lynch, 1999; Manganello, 2011; C. Nelson, J. Nelson, and Malone, 2004). While the findings from this study do not indicate that the English language test scores have any significant linear relationship to CGPAs, there are not any reasons based on the findings to indicate that the English language admission requirements should be modified.

Furthermore, the results from this study provided insight into the perceptions of UCF international graduate students' opinions of the English language tests. International students face additional obstacles compared to domestic students when it comes to studying in another country. It is important that an international student cannot only succeed in their academic study, but that they are confident in their English language abilities. As Yeh and Inose (2003)

discussed in their research, English fluency contributed to international students' acculturative stress. While it is important to ensure that the English language score requirements are appropriate for an international graduate student to be capable of completing a program in English, it is also essential for the international graduate student to be confident that their English language abilities are sufficient.

The findings from this study provided perspectives of current international graduate students. It was an encouraging result to find that, overall, the international graduate students at UCF felt prepared for study and life in the United States as it related to their English language abilities.

#### Limitations of the Study

The following section addresses limitations of the study. The data collected and analyzed only accounts for students who were admitted and subsequently graduated from UCF. It is possible that the required English language test scores may have kept some international students from being accepted at UCF. Therefore, the study only addressed students who were successful in being admitted to UCF based on their English language test scores, as well as other admission requirement factors.

A linear regression analysis was used to analyze research questions one and two. Since the assumptions of linear regression were not met, the linear regression models could not be used to predict international graduate students' CGPAs based on their English language test scores. It is possible that another type of statistical analysis could have found a relationship between English language test scores and CGPA.

The collected data had some missing data related to the third research question. If an English language test requirement was waived for admission purposes, it was protocol for the



graduate admissions staff to enter a reason why the score was waived for the student.

However, the findings indicated that this protocol was not always followed, and subsequently there was missing data related to reasons why the requirement was waived. Though, the data that were analyzed primarily explored the waived and non-waived international students' CGPAs, the fact that some reasons for a waiver were not included remained inconsequential to the findings.

As suggested by C. Nelson, J. Nelson, and Malone (2004) in the literature review, there was some correlation between English language test scores and an international student's GPA within their initial credit hours at the university. However, in this study it was not possible to determine a linear relationship between the English language test scores and GPA within two semesters, when the relationship is expected to be apparent. Therefore, the study was limited in that it only addressed international graduate students who had completed their program, and thus had more years to improve their English as they continued their studies at UCF.

In addition, the analysis did not account for the subsections of the TOEFL and IELTS tests such as the reading, writing, listening, and speaking sections, though some of the research in the literature review suggested that the TOEFL subsections accounted for some variations in academic success (Ginther and Yan, 2018; Harsch, Ushioda, and Ladroue, 2017). However, it was not possible within the scope of this study to ascertain if any of these subsections had more or less of an impact on academic success when compared to other subsections.

Previous studies had suggested that there may be a correlation between the English language tests and disciplines (Bayliss & Ingram, 2006; Bridgeman, Cho & DiPietro, 2016; Cho & Bridgeman, 2012; Wait & Gressel, 2009). While the CGPA and English language test

scores were separated by colleges in this research, some of the sample sizes in the retrieved data related to English language tests and colleges were too small to create meaningful analyses. Therefore, not all colleges were compared. Furthermore, data related to specific colleges were not investigated further by their specific disciplines.

Moreover, the survey included current international graduate students whose academic success was not yet determined, whereas the retrieved data examined records from international graduate students who had graduated. Therefore, current international students may have a different perspective compared to international students who have graduated.

Another limitation was that it was not possible to receive a list of international students who were dismissed, withdrew, or were put on academic probation. Therefore, the study was unable to consider if English language test scores had any statistically significant linear relationship to the final CGPA for students who were not able to complete or who had academic issues within the program.

The surveys were also distributed to international students who may check their school email addresses infrequently. This limitation could have an impact on the number of international graduate students who saw the request for the survey, and subsequently completed the survey. If an international student did not check their school email address during the timeframe when the survey was distributed, then they would not have seen the survey request.

Finally, the analysis did not control for variables such as gender, race, native language, country in which the student obtained their undergraduate degree, or other confounding variables. Some or all of these variables may have had an impact on their English language score and academic success.

### Recommendations for Future Research

While this study examined data from both current and past international graduate students, more could be learned from future research related to this topic. The following are recommendations for areas that would benefit from future research.

Although the findings in this study did not indicate a significant linear relationship between English language test scores and CGPAs, it is unknown why attrition rates are higher for international graduate students at UCF than for domestic graduate students. Identifying the root causes for these varying attrition rates would be beneficial in helping to better understand and assist international students. Being able to obtain information on students who withdrew, were dismissed, or placed on academic probation from programs would be necessary to analyze the root causes of attrition. Furthermore, future research could also explore any intervening measures for students who were placed on academic probation.

Future research could also be conducted to determine if international students' GPAs improved over the duration of their programs. While the GPAs may not be directly linked to their English language ability, it would be informative to determine if their GPA remained constant or improved/declined over time. Furthermore, exploring the relationship of English language test scores to GPA after the first and second semesters - where the influence of English capability to GPA may be the strongest - would be informative.

Additional research could be conducted to identify if any of the TOEFL or IELTS subsections were directly linked to the academic success of international graduate students. As indicated in previous research (Ginther and Yan, 2018; Harsch, Ushioda, and Ladroue, 2017), English language subsections are at times related to an international student's academic success. By determining which, if any, subsections are better able to predict

academic success, program admissions staff could make a better informed decision about an international applicant.

Further research is also suggested with regard to including former international graduate students. While this study received feedback from current international students, it would be valuable to hear the perspectives of international graduate students who have graduated as it relates to their English language experience at UCF.

Lastly, exploring other variables such as gender, race, native language, undergraduate GPA, and country from which they obtained their undergraduate degree may allow researchers to better understand their impact on international graduate students' academic success.

### Summation

The purpose of this study was to examine if the English language test scores were adequate for admission purposes. Since the assumptions of linear regression were not met, linear regression models were not able to be used to predict CGPA based on TOEFL or IELTS scores. While the analyses from research questions one and two indicated that there was not a statistical relationship or predictability between the English language test scores and CGPA, the findings from research questions four and five demonstrated that international students felt prepared with regard to their English language ability. Based on the findings of this study, the TOEFL and IELTS test score admission requirements do not warrant modification. However, these findings were based on GCPA, and more studies are recommended in order to obtain a more robust understanding of the implications of the English language tests on international graduate students' success at UCF.

The goal behind this research was to gain insight into the linkage between English language tests and international graduate students' academic success. While it would have been ideal to have identified a direct linkage between the English test scores and CGPA, this study did provide insight into the English language tests. By better understanding the international students' admission requirements, and the requirements' subsequent effects, the academic community can better help international students to be successful and to thrive during their academic careers.

**APPENDIX A:  
IRB APPROVAL LETTER**



University of Central Florida Institutional Review Board  
Office of Research & Commercialization  
12201 Research Parkway, Suite 501  
Orlando, Florida 32826-3246  
Telephone: 407-823-2901 or 407-882-2276  
[www.research.ucf.edu/compliance/irb.html](http://www.research.ucf.edu/compliance/irb.html)

### **Determination of Exempt Human Research**

From: **UCF Institutional Review Board #1  
FWA00000351, IRB00001138**

To: **Rebekah Shbeeb**

Date: **September 06, 2018**

Dear Researcher:

On 09/06/2018, the IRB reviewed the following modifications as human participant research that is exempt from regulation:

Type of Review: Exempt Determination  
Modification Type: Revisions to the survey  
Project Title: The Relationship of English Language Scores on International Students' Graduation Rates  
Investigator: Rebekah Shbeeb  
IRB Number: SBE-18-14265  
Funding Agency:  
Grant Title:  
Research ID: N/A

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these changes affect the exempt status of the human research, please contact the IRB. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

In the conduct of this research, you are responsible to follow the requirements of the [Investigator Manual](#).

This letter is signed by:

A handwritten signature in black ink, appearing to read "Gillian Morien".

Signature applied by Gillian Morien on 09/06/2018 02:48:19 PM EDT

Designated Reviewer

## **APPENDIX B: SURVEY QUESTIONS**



# Relationship of English Language Scores

---

## SURVEY INSTRUCTIONS

This study is concerned with how international students perform on academic English proficiency tests and their subsequent academic performance at the University of Central Florida.

Answers to this survey will help reveal the effects of English language scores on academic performance and graduation. The survey is anonymous and provides no compensation or other payment for participation. Individual responses and personal information will not be disclosed to any academic or immigration agency. Participation in this research has no impact on academic standing or visa status.

This survey is aimed at international students on an F or J visa who have either taken an academic English test or who used other qualifications to demonstrate their English proficiency for university study at UCF.

You may withdraw from the study at any time by closing the browser. You are also free to decline to answer any questions that you do not wish to answer. If you have questions, concerns, or complaints, please contact me at [rebekah.shbeeb@gmail.com](mailto:rebekah.shbeeb@gmail.com); 321-222-0548.

Kind regards,

Rebekah Shbeeb,  
EdD Student  
University of Central Florida

---

Q1 What is your current program of study at UCF?

---

---

Q2 What type of degree are you seeking? Please select all that apply.

- ☐ Master (1)
  - ☐ Doctoral (2)
  - ☐ Specialist (3)
  - ☐ Certificate (4)
- 

Q3 How many years (including the 2018-19 academic year) have you been in that program at UCF?

---

Q4 How many more semesters (beyond this current semester) are expected before your graduation from this program?

---

Q5 In what country did you obtain your undergraduate degree?

---

Q6 Select all that apply to your English language admissions requirements.

- ☐ In my application I submitted a TOEFL score (1)
  - ☐ In my application I submitted an IELTS score (2)
  - ☐ In my application I was exempt from submitting English language scores (3)
-

*Display This Question:*

*If Q6 = In my application I submitted a TOEFL score*

Q7 What was your overall score on the TOEFL?

---

*Display This Question:*

*If Q6 = In my application I submitted an IELTS score*

Q8 What was your overall score on the IELTS?

---

*Display This Question:*

*If Q6 = In my application I submitted a TOEFL score*

*Or Q6 = In my application I submitted an IELTS score*

Q9 Do you feel that the score was an accurate assessment of your English language abilities?

☐ Yes (1)

☐ No (2)

*Display This Question:*

*If Q6 = In my application I was exempt from submitting English language scores*

Q10 What was the reason for the exemption from taking an English placement test?

---

	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Strongly agree (5)
When I began study in this program at UCF, I was adequately prepared in my classes with regards to my English ability (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I began study in this program at UCF, my ability to use English was adequate for living in the US (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My English language abilities are similar to my classmates that are also non-native English speakers (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My English language abilities are similar to my classmates that are native English speakers (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*Q6 = In my application I submitted a TOEFL score*

The English language score requirement of 80 for the TOEFL is high enough for admission purposes (5)

☐☐☐☐☐

*Q6 = In my application I submitted an IELTS score*

The English language score requirement of 6.5 for the IELTS is high enough for admission purposes (6)

☐☐☐☐☐

The English language score requirements are too high for graduate admission purposes (7)

☐☐☐☐☐

Taking the TOEFL/IELTS should NOT be required for applicants who obtained a degree from an English speaking country (8)

☐☐☐☐☐

Q12 What is your age?

---

---

Q13 What is your racial/ethnic background?

---

---

Q14 What is your gender?

---

---

Q15 What is your first/home language?

---

---

Q16 What is your overall GPA?

---

---

Q17 If you have any further comments or opinions you wish to express in relation to English language scores, please add them in the following space.

---

---

---

## REFERENCES

- Andrade, M. S. (2006). International Students in English-Speaking Universities: Adjustment Factors. *Journal of Research in International Education*, 5(2), 131–154. Retrieved from <https://login.ezproxy.net.ucf.edu/login?auth=shibb&url=https://search-ebscohost-com.ezproxy.net.ucf.edu/login.aspx?direct=true&db=eric&AN=EJ845559&site=eds-live&scope=site>
- Arcuino, C. L. (2013). *The Relationship between the Test of English as a Foreign Language (TOEFL), the International English Language Testing System (IELTS) scores and academic success of international master's students* (Unpublished doctoral dissertation). Colorado State University. Retrieved from [https://mountainscholar.org/bitstream/handle/10217/78818/Arcuino\\_colostate\\_0053A\\_11657.pdf?sequence=1&isAllowed=y](https://mountainscholar.org/bitstream/handle/10217/78818/Arcuino_colostate_0053A_11657.pdf?sequence=1&isAllowed=y)
- Arrigoni, E., & Clark, V. (2015). Investigating the appropriateness of IELTS cut-off scores for admissions and placement decisions at an English-medium university in Egypt. IELTS Research Reports Online Series, 29.
- Baer, J. (2018). *Fall 2018 International Student Enrollment Hot Topics Survey* (pp. 1-13, Rep.). New York, NY: Institute of International Education.
- Bayliss, A., & Ingram, D.E. (2006). IELTS as a predictor of academic language performance. Proceedings from *Australian International Education Conference 2006*.
- Braun, V. & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3, 77-101.
- Bridgeman, B., Cho, Y., & DiPietro, S. (2016). Predicting grades from an English language

- assessment: The importance of peeling the onion. *Language Testing*, 16(33), 3rd ser., 307-318. doi:10.1177/0265532215583066
- Brown, L., & Holloway, I. (2008). The Adjustment Journey of International Postgraduate Students at an English University: An Ethnographic Study. *Journal of Research in International Education*, 7(2), 232–249. Retrieved from <https://login.ezproxy.net.ucf.edu/login?auth=shibb&url=https://search-ebscohost-com.ezproxy.net.ucf.edu/login.aspx?direct=true&db=eric&AN=EJ845156&site=eds-live&scope=site>
- Cho, Y., & Bridgeman, B. (2012). Relationship of TOEFL iBT[R] Scores to Academic Performance: Some Evidence from American Universities. *Language Testing*, 29(3), 421-442.
- Educational Testing Service. (2005). *TOEFL Internet-based Test Score Comparison Tables* [PDF file]. Retrieved from [https://www.kuleuven.be/english/admissions/lang/TOEFL\\_iBT\\_Score\\_Comparison\\_Tables.pdf](https://www.kuleuven.be/english/admissions/lang/TOEFL_iBT_Score_Comparison_Tables.pdf)
- Educational Testing Service. (2018-a). About the test. Retrieved from <https://www.ets.org/toefl/ibt/about>
- Educational Testing Service. (2018-b). Understanding Your TOEFL iBT® Test Scores. Retrieved June 19, 2018, from <https://www.ets.org/toefl/ibt/scores/understand/>
- Educational Testing Service. (2018-c). *Test and Score Data Summary for TOEFL iBT Tests* (Rep.). Retrieved [https://www.ets.org/s/toefl/pdf/94227\\_unlweb.pdf](https://www.ets.org/s/toefl/pdf/94227_unlweb.pdf)
- Feast, V. (2002). The Impact of IELTS Scores on Performance at University. *International Education Journal*, 3(4), 70-85.



Florida Board of Governors Authority: Section 7(d), Art. IX, Fla. Const., History–Adopted 7-6-72, 12-17-74, Amended 6-21-83, 8-11-85, Formerly 6C-6.09, Amended 12-9-91, 9-27-07, Amended and Renumbered 1-29-09.

Ginther, A., & Elder, C. (2014). A Comparative Investigation Into Understandings and Uses of the TOEFL iBT® Test, the International English Language Testing Service (Academic) Test, and the Pearson Test of English for Graduate Admissions in the United States and Australia: A Case Study. *ETS Research Report Series*, 2014(2), 1-39. doi:10.1002/ets2.12037

Ginther, A., & Yan, X. (2018). Interpreting the Relationships between TOEFL iBT Scores and GPA: Language Proficiency, Policy, and Profiles. *Language Testing*, 35(2), 271-295.

Harsch, C., Ushioda, E., & Ladroue, C. (2017). Investigating the Predictive Validity of TOEFL iBT® Test Scores and Their Use in Informing Policy in a United Kingdom University Setting. *ETS Research Report Series*. doi:10.1002/ets2.12167

Hahs-Vaughn, D. L. (2017). *Applied multivariate statistical concepts*. Abingdon, Oxon: Routledge, an imprint of the Taylor & Francis Group.

Hill, K., Storch, N., & Lynch, B. (1999). A comparison of IELTS and TOEFL as predictors of academic success. In R. Tulloh (Ed.), *IELTS Research Reports* (Vol. 2, pp. 53-63). Canberra.

Institute for International Education. (2017-a). International Student Enrollment Trends, 1948/49-2016-2017. Retrieved October 31, 2018, from <https://www.iie.org/Research-and-Insights/Open-Doors/Data/International-Students/Enrollment>

- Institute of International Education. (2017-b). New International Student Enrollment, 2006/07 – 2016/17. Retrieved February 19, 2019, from <https://www.iie.org/Research-and-Insights/Open-Doors/Data/International-Students/Enrollment>
- Institute of International Education. (2018). “International Student Enrollment Trends, 1948/49-2017/18.” *Open Doors Report on International Education Exchange*. Retrieved from <http://www.iie.org/opendoors>
- Institute of International Education Open Doors. (2018). *2018 “Fast Facts”* (pp. 1-2, Rep.). Institute of International Education Open Doors.
- International English Language Testing Service. (2018-a). About us. Retrieved February 18, 2019, from <https://www.ielts.org/en-us/info-pages/about-us>
- International English Language Testing Service. (2018-b). How IELTS is scored. Retrieved February 19, 2019, from <https://www.ielts.org/en-us/about-the-test/how-ielts-is-scored>
- International English Language Testing Service. (2019). *Guide for agents*. Retrieved from <https://www.ielts.org/-/media/publications/guide-for-agents/ielts-guide-for-agents-us.ashx?la=en-us>
- Kuo, Y.-H. (2011). Language Challenges Faced by International Graduate Students in the United States. Online Submission, 1, 38–42. Retrieved from <https://login.ezproxy.net.ucf.edu/login?auth=shibb&url=https://search-ebscohost-com.ezproxy.net.ucf.edu/login.aspx?direct=true&db=eric&AN=ED526158&site=eds-live&scope=site>
- Nelson, C. V., Nelson, J. S., & Malone, B. G. (2004). Predicting Success of International Graduate Students in an American University. *College and University*, 80(1), 19–27. Retrieved from

<https://login.ezproxy.net.ucf.edu/login?auth=shibb&url=https://search-ebscohost-com.ezproxy.net.ucf.edu/login.aspx?direct=true&db=eric&AN=EJ732571&site=eds-live&scope=site>

Ross, K. M. (2017, February 16). IELTS vs. TOEFL: What Are the Differences? Retrieved February 22, 2019, from <https://www.usnews.com/education/best-colleges/articles/2017-02-16/ielts-vs-toefl-what-are-the-differences>

Schoepp, K. (2018). Predictive validity of the IELTS in an English as a medium of instruction environment. *Higher Education Quarterly*, 72(4), 271–285. <https://doi-org.ezproxy.net.ucf.edu/10.1111/hequ.12163>

Shbeeb, R. A. (2017-a). [English Test Comparison]. Unpublished raw data.

Shbeeb, R. A. (2017-b). [Attrition Rates]. Unpublished raw data.

Stangroom, J. (2019-a). Pearson Correlation Coefficient Calculator. Retrieved from <https://www.socscistatistics.com/tests/pearson/Default.aspx>

Stangroom, J. (2019-b). P Value from Pearson (R) Calculator. Retrieved from <https://www.socscistatistics.com/pvalues/pearsondistribution.aspx>

Sümer, S., Poyrzli, S., & Grahame, K. (2008). Predictors of Depression and Anxiety Among International Students. *Journal of Counseling & Development*, 86(4), 429–437. <https://doi-org.ezproxy.net.ucf.edu/10.1002/j.1556-6678.2008.tb00531>.

University of Central Florida. (2017). *Collective Impact Strategic Plan* (pp. 1-19, Rep.). Orlando, FL.

University of Central Florida. (2018-a). General Graduate Policies. Retrieved June 28, 2018, from <http://catalog.ucf.edu/content.php?catoid=4&navoid=201>

University of Central Florida. (2018-b). About UCF. Retrieved May 31, 2018, from <https://www.ucf.edu/about-ucf/>

- University of Central Florida. (2018-c). UCF Facts 2017-2018. Retrieved May 31, 2018, from <https://www.ucf.edu/about-ucf/facts/>
- University of Central Florida. (2018-d). About the College. Retrieved May 31, 2018, from <https://graduate.ucf.edu/about/>
- University of Central Florida. (2018-e). Staff Directory. Retrieved June 28, 2018, from <https://graduate.ucf.edu/staff-directory/>
- University of Central Florida. (2018-f). International Graduate Student Policies. Retrieved from <https://graduate.ucf.edu/international-applicants/>
- University of Central Florida. (2018-g). International Applicants. Retrieved February 18, 2019, from <http://catalog.ucf.edu/content.php?catoid=4&navoid=202>
- University of Central Florida Institutional Knowledge Management. (2018-a, March 16). [Preliminary Spring 2018 Headcount by Classification, Time, Gender and Ethnicity Total University]. Unpublished raw data.
- University of Central Florida Institutional Knowledge Management. (2018-b, March 16). [Fall 2017 UCF Student Enrollment]. Unpublished raw data.
- Vu, L. T. & Vu, P. H. (2013). Is the TOEFL score a reliable indicator of international graduate students' academic achievement in American higher education?. *International Journal on Studies in English Language and Literature (IJSELL)*, 1(1), 11-19.
- Wait, I. W., & Gressel, J. W. (2009). Relationship Between TOEFL Score and Academic Success for International Engineering Students. *Journal of Engineering Education*, 98(4), 389-398. doi:10.1002/j.2168-9830.2009.tb01035.x

- Wette, R., & Furneaux, C. (2018). The academic discourse socialisation challenges and coping strategies of international graduate students entering English-medium universities. *System*, 78, 186-200. doi:10.1016/j.system.2018.09.001
- Woodrow, L. (2006). Academic success of international postgraduate education students and the role of English proficiency. *University of Sydney Papers in TESOL*, 1, 51–70
- Yeh, C. J., & Inose, M. (2003). International students' reported English fluency, social support satisfaction, and social connectedness as predictors of acculturative stress. *Counselling Psychology Quarterly*, 16(1), 15–28. <https://doi-org.ezproxy.net.ucf.edu/10.1080/0951507031000114058>
- Yen, D., & Kuzma, J. (2009). Higher IELTS score, higher academic performance? The validity of IELTS in predicting the academic performance of Chinese students. *Worcester Journal of Learning and Teaching*, (3), 1-7
- Xu, M. (1991). The impact of English-language proficiency on international graduate students perceived academic difficulty. *Research in Higher Education*, 32(5), 557-570. doi:10.1007/bf00992628
- Zong, J., & Batalova, J. (2018, June 05). International Students in the United States. Retrieved February 16, 2019, from <https://www.migrationpolicy.org/article/international-students-united-states>